

U.S. Environmental Protection Agency
Region 10
Seattle, Washington

**Wyckoff Groundwater Operable Unit
Wyckoff/Eagle Harbor Superfund Site
INTERIM RECORD OF DECISION**

September 30, 1994

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**DECLARATION
FOR THE
INTERIM RECORD OF DECISION**

Site Name and Location

Wyckoff/Eagle Harbor Superfund Site
Groundwater Operable Unit
City of Bainbridge Island, Washington

Statement of Basis and Purpose

This decision document presents the interim remedial action selected by the U.S. Environmental Protection Agency (EPA) for the Wyckoff Groundwater Operable Unit, one of four operable units at the Wyckoff/Eagle Harbor Superfund site, located at Bainbridge Island, Kitsap County, Washington.

The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

Concurrence by the State of Washington, Department of Ecology is under consideration.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Selected Remedy

The remedy selected in this interim Record of Decision addresses the need to contain contaminated groundwater and non-aqueous phase liquids (NAPL) to the immediate area of the wood treatment operations of the former Wyckoff facility and not allow it to migrate into Eagle Harbor or into deeper drinking water aquifers. The selected remedy for the Wyckoff Groundwater Operable Unit includes:

- ♦ Replace existing groundwater treatment plant,

- ♦ Evaluate, maintain, and upgrade existing extraction system/hydraulic barrier,
- ♦ Evaluate performance of current extraction system/ install physical barrier,
- ♦ Seal and abandon onsite water supply wells.

Statutory Determination

This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements for this limited-scope action, and is cost effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the Groundwater Operable Unit, the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume as a principal element will be addressed fully by the final response action.

Subsequent actions are planned to fully address the threats posed by the conditions at this operable unit. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD, review of this site and this remedy will be ongoing as EPA continues to develop final remedial alternatives for the Groundwater Operable Unit.

9/29/94
Date

Chuck Clarke
Chuck Clarke
Regional Administrator
U.S. Environmental Protection Agency
Region 10

DECISION SUMMARY

Wyckoff/Eagle Harbor Superfund Site
Groundwater Operable Unit
City of Bainbridge Island, Washington

A. Site Name, Location, and Description

The Wyckoff/Eagle Harbor Superfund site is located on the east side of Bainbridge Island, in Central Puget Sound, Washington (Figure 1). The site includes an inactive 40-acre wood-treating facility (Wyckoff facility), the adjacent Eagle Harbor, and other upland sources of contamination to the harbor, including a former shipyard. The Wyckoff facility has been divided into two operable units (OUs): the Wyckoff Facility OU, including surface soil, subsurface soil, and surface water, and the Wyckoff Groundwater OU, including groundwater at or beneath the facility. The Wyckoff OUs, together with the East and West Harbor OUs, constitute the Wyckoff/Eagle Harbor Superfund site as shown in Figure 2. This interim ROD addresses only the Wyckoff Groundwater OU.

Land use on Bainbridge Island, recently incorporated as a city, is principally residential, with some commercial and industrial use. The Wyckoff facility is located on the south shore at the mouth of the harbor. The former City of Winslow lies on the north side of Eagle Harbor. Residences, commercial centers, a city park, several marinas, and a ferry terminal characterize the northern shoreline. The western and southern shores are primarily lined with residences, farms, marinas, and a boatyard. The primary land use to the south of the facility is residential.

The harbor supports several fish resources. Coho and chum salmon once used the creek on the north shore to spawn, and fingerlings are released there regularly. The creek at the head of the harbor is a salmon nursery, and chum may use the drainage on the south side as a spawning ground and nursery. Eagle Harbor may also be a spawning ground for surf smelt and Pacific sand lance. Other fish and invertebrates present in the harbor include several flatfish species, rockfish, pile perch, cod, lingcod, crabs, and shrimp. Several shellfish species are present in intertidal and subtidal areas.

Bainbridge Island supports a wide variety of resident and migratory birds and other wildlife. Major bird groups represented include waterfowl, shorebirds, gulls, songbirds, and raptors. Although residents report sightings of bald eagles, no critical habitats are formally designated near the site.

The shoreline to the Wyckoff property has been extended and filled at least twice. The average ground surface elevation at the Wyckoff Facility OU is approximately ten feet above mean sea

Figure 1
Site Location

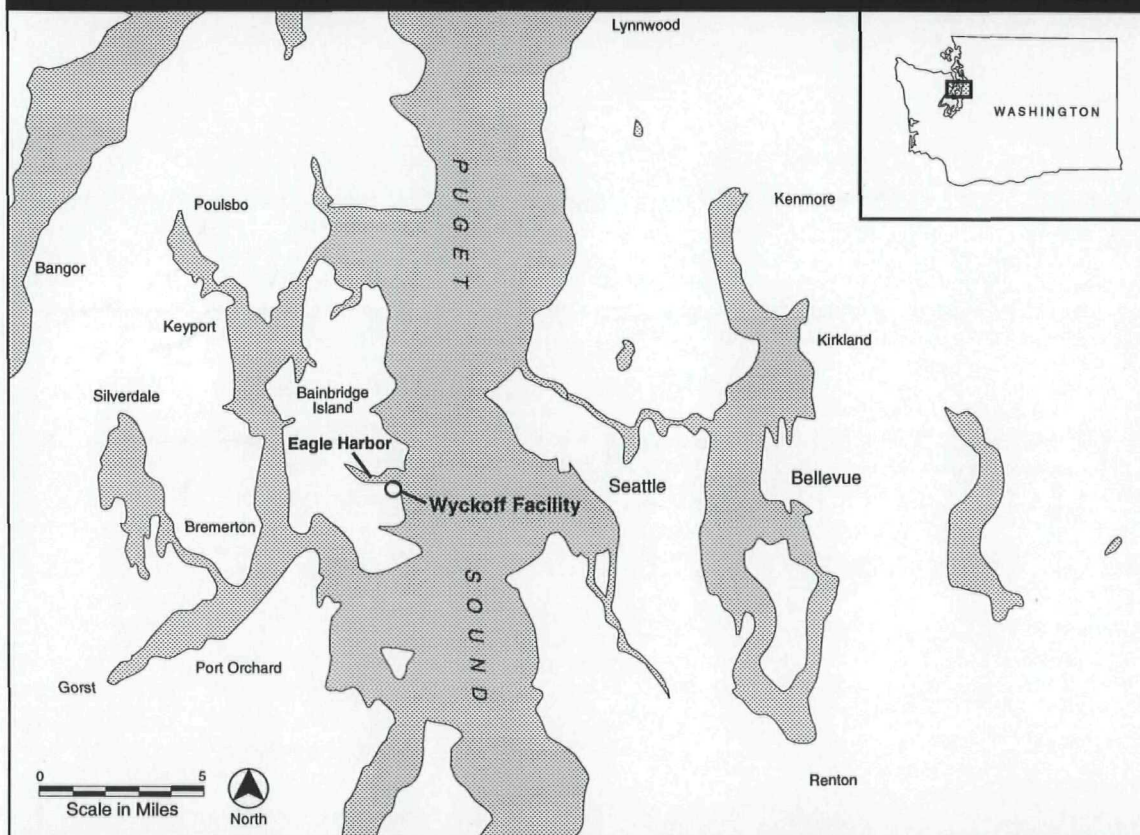
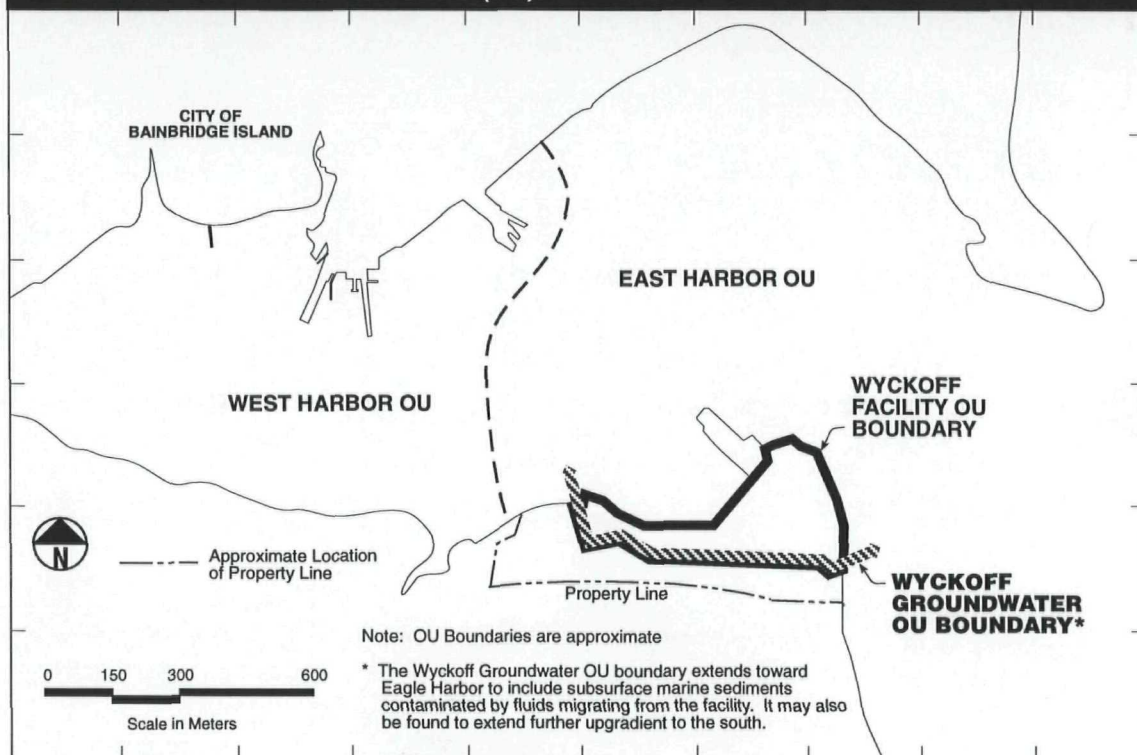


Figure 2
WYCKOFF/EAGLE HARBOR
SUPERFUND SITE OPERABLE UNITS (OU)



level. A tree-covered bluff, about 200 feet above sea level, defines the southern boundary of the Wyckoff Facility OU.

A drainage ditch (known as the perimeter ditch) is located at the base of the bluff, south of the Oil/Creosote Unloading Dock and the Wyckoff facility. The perimeter ditch collects runoff from the bluff and discharges it to Eagle Harbor via three underground culverts.

Numerous structures including buildings, tanks, and sumps, still exist at the Wyckoff facility. The buildings are not in use and contain potentially hazardous materials. Some areas of the facility (e.g., northeast of the shop building and in the vicinity of the log peeler) have piles of debris that include metal, wood, rebar, and concrete. Most of the surface of the site is soil and gravel.

There are two deep drinking water supply wells, Wells B and C, located on-site in the facility process area. In addition there is evidence of four additional water supply wells located on-site which are no longer in use. Table 1 summarizes the information known about these wells. Their locations are shown in Figure 3.

Wells B and C have provided drinking water to the facility and the Rockaway Beach Community. A replacement source of drinking water is being developed for the community by the City of Bainbridge Island. The new well for this community, the South Eagle Harbor Well, has recently been sited and installed in an area west of the facility. This new well is expected to be available for use in late 1994.

The wastes resulting from the operations at the facility are Resource Conservation and Recovery Act (RCRA) listed wastes. The use of pentachlorophenol when the facility was in operations results in an F032 listing. The use of creosote results in an F034 listing. Inorganic wood treating preservatives were not used at this site, so the F035 listing does not apply.

B. Site History and Enforcement Activities

Wood-preserving operations began at the facility in the early 1900s and continued until 1988. Operations over the years included the use and storage of aromatic oil, creosote, and other chemicals; wastewater treatment and discharge; wood preserving; and storage of treated wood and poles. The Wyckoff facility is no longer operational; however, some treated wood still remains onsite.

The wood-preserving process at the Wyckoff facility primarily used the organic preservatives, creosote and pentachlorophenol (PCP). Creosote is a blend of various coal tar distillates that

Table 1
Well Drilling, Construction, and Hydraulic Data Summary for Water Supply Wells
At the Wyckoff Facility

Well Description	Well A	Well B	Well C	Well D	Navy Well	Unidentified Well
Water Rights No.	061267 (35 gpm)	061270 (10 gpm)	061269 (50 gpm)	061271 (11 gpm)	061268 (50 gpm)	Unknown
Ecology Registration No.	048846	048843	048844	048842	048845	Unknown
Map Reference	Bremerton East	Bremerton East	Bremerton East	Bremerton East	Bremerton East	Bremerton East
Location	SE1/4, NE1/4, Sect. 35, T25N, R2E	SE1/4, NE1/4, Sect. 35, T25N, R2E	SE1/4, NE1/4, Sect. 35, T25N, R2E	SE1/4, NE1/4, Sect. 35, T25N, R2E	SE1/4, NE1/4, Sect. 35, T25N, R2E	SE1/4, NE1/4, Sect. 35, T25N, R2E
Easting	1588927.14	1589067.02	1589150.99	1587580 (4)	1588205 (4)	1587103 (4)
Northing	229182.71	229638.21	229676.92	229211 (4)	229026 (4)	229273 (4)
General Description	Shallow Well at the RR Tracks, AKA Well No. 1	Artesian well near sump, AKA Well No. 3	Artesian well near shoreline, AKA Well No. 4	AKA Well No. 2	AKA Well No. 5	S. side of Log Dump Road, W of Log Dump "A" Frame
Drilling Information						
Driller	Unknown	Unknown	N. C. Jannsen	Unknown	Unknown	Unknown
Drilling Method	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Drill Date	Prior to June 1924	1914	1942	1943	1945	Unknown
Installation Date	Prior to June 1924	1914	1942	1943	1945	Unknown
Ground Surface Elevation (feet)	12.8	Approximately 9.4 (1)	Approximately 9.4 (1)	Approximately 11.3(2)	Approximately 11.3(2)	Approximately 11.3(2)
Drill Depth (feet below ground surface[bgs])	30	500 (?)	813	Unknown	Unknown	Unknown
Depth to Water (feet bgs)	Approximately 8 (5)	Flowing	Flowing	Approximately 6 (5)	Unknown	Unknown
Well Construction						
Total Well Depth (feet bgs)	30 (6)	500 (per R& N, July 12, 1979)	813 (per drilling log)	23 (5)	Unknown	Unknown
Sump length (feet)	Unknown	Unknown	13	Unknown	Unknown	Unknown
Casing Diameter (inches)	Unknown	Unknown	10 to 8	Unknown	Unknown	Unknown
Casing/Screen Type	Unknown	Unknown	Welded steel	Unknown	Unknown	Unknown
Slot size (inches)	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Top of Screen (feet bgs)	Unknown	Unknown	600	Unknown	Unknown	Unknown
Bottom of Screen (feet bgs)	Unknown	Unknown	800	Unknown	Unknown	Unknown
Sand Pack	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Top of Sand Pack (feet bgs)	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Bottom of Sand Pack (feet bgs)	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Bentonite Seal?	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Surface Seal	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Well Use	Cooling Water	Drinking Water	Drinking Water	Cooling Water	Unknown	Unknown

Table 1
Well Drilling, Construction, and Hydraulic Data Summary for Water Supply Wells
At the Wyckoff Facility

Geologic Log Available?	No	No	Yes	No	No	No
Hydraulic Data (3)						
Flow Rate (gallons per minute)	15	6.8	53.2	Not measured	Not measured	Not measured
Approximate Specific Capacity	3.78	1.5	14.3	Not measured	Not measured	Not measured
Hydraulic Head (feet)	Unknown	+1.25	Flowing (not measured)	Not measured	Not measured	Not measured
Comments	There is very little available information regarding this well. Water from this well was used for cooling water in the wood-treating plant.	There is very little available information regarding this well.	This well was re-developed in October 1979 by R&N and approx. 100 feet of sand was removed. R&N (10/8/79 letter to M. Walker/Wyckoff) noted that the well is also perforated from 90 to 105 feet bgs, although little or no water comes from this area.	There is very little available information regarding this well.	There is very little available information regarding this well.	There is very little available information regarding this well.

(1) Based on ground surface elevation measured at PO1 (CH2M HILL, April 16, 1992).

(2) Based on ground surface elevation measured at MW22 (CH2M HILL, April 16, 1992).

(3) From a letter to M. Walker/Wyckoff from R & N dated 7/12/79 (measurements made on 8/3/73).

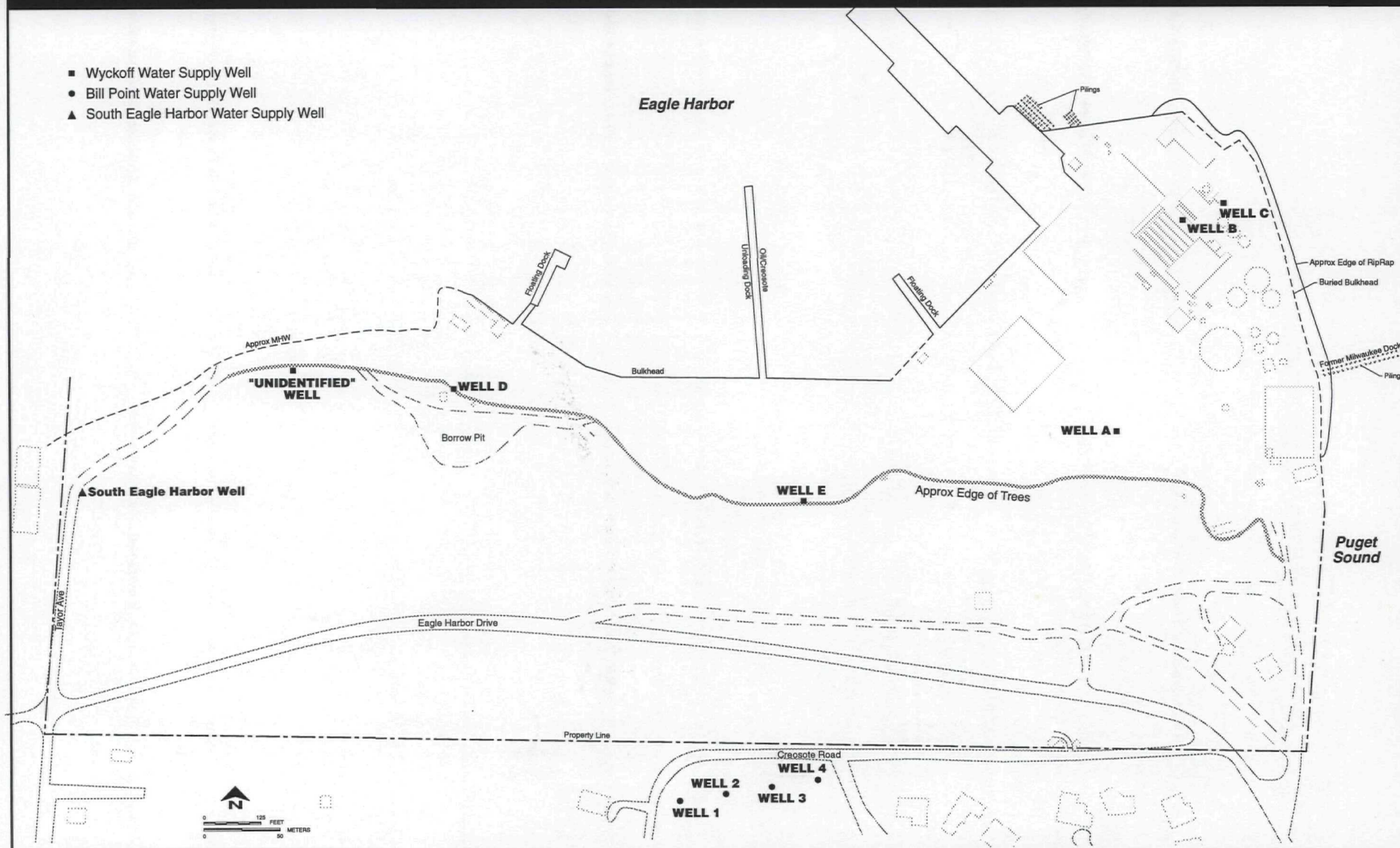
(4) Coordinates are estimated based on field bearings and distances recorded by Don Johnson, August 30, 1973; approximate error is +/- 50 to 100 feet.

(5) Apparent depth measured by CH2M HILL on 8/23/94.

(6) Total well depth (30) from bottom of current wellhead vault (7 feet below ground surface); total well depth is 37 feet below current ground surface.

Note: R & N: Robinson and Noble.

Figure 3
WYCKOFF FACILITY
LOCATION OF WATER SUPPLY WELLS



NPE69131.08.02 • EPA2R1 • 8/27/94 • CJS

- NOTES:
1. Monitoring and groundwater extraction well locations and selected structures based on land survey conducted by CH2M HILL March 1992, property line and horizontal control monuments based on Farenthold and Assoc. map (no date), and selected structures and roads based on EPA 6-10-63 and 7-30-92 aerial photographs.
 2. Water supply well designations per U.S. Naval Radio Station Map, 1943.

may contain up to 90 percent polynuclear aromatic hydrocarbons (PAHs) mixed with other hydrocarbons. Technical grade PCP contains 85 to 95 percent PCP; the remainder is a mix of other chlorinated phenols and about 0.1 percent dioxins and furans.

The Wyckoff/Eagle Harbor site was proposed to the National Priorities List (NPL) in September 1985. Under the Washington State Hazardous Waste Cleanup Program, Washington Department of Ecology (Ecology) completed a Preliminary Investigation of sediment contamination in Eagle Harbor (November 1986). In 1985, the National Oceanic and Atmospheric Administration (NOAA) completed a study relating the presence of PAHs in sediment to the high rate of liver lesions in English Sole from Eagle Harbor. In March 1987, the Wyckoff Company entered into an Administrative Order on Consent (AOC) under CERCLA with EPA for further investigation of the facility.

The site, including Eagle Harbor, the wood-treating facility, and other sources of contamination to Eagle Harbor, was added to the NPL in July 1987, with EPA as lead agency. At that time the site was divided into two OUs, the Wyckoff facility and Eagle Harbor. A potentially responsible party (PRP) search initiated in 1987 identified the Wyckoff Company as the party potentially liable for cleanup costs for the facility and the underlying groundwater.

EPA initiated the RI/FS for Eagle Harbor and used enforcement authorities to address ongoing releases of contamination from the wood-treating facility. EPA enforcement actions at the wood-treating facility after the site listing on the NPL include the following:

- ♦ A July 1988 Administrative Order on Consent, under which the Wyckoff Company agreed to conduct an Expedited Response Action (ERA). The ERA, intended to minimize releases of oil and contaminated groundwater to the East Harbor, called for a groundwater extraction and treatment system and other source control measures.
- ♦ A June 1991 Unilateral Administrative Order (UAO) requiring the Wyckoff Company (renamed and currently known as Pacific Sound Resources, Inc.) to continue the ERA with enhancements. The UAO called for increased groundwater extraction and treatment rates, improved system monitoring, and removal of sludge stored or buried at the Wyckoff Facility OU.

Since 1988, several environmental cleanup activities have been initiated at the Wyckoff facility as expedited response actions (ERA) to reduce threats to human health or the environment from releases or possible releases, of hazardous substances. These activities have been conducted by both EPA and the Wyckoff

Company and have included asbestos abatement, removal of all liquids and sludges from tanks, removal of buried sludges, and the installation of a groundwater extraction system and a groundwater treatment plant.

The groundwater treatment system processes groundwater contaminated with elevated levels of PCP and PAH. The groundwater is obtained from seven extraction wells located within the Wyckoff Groundwater OU that are screened in the water table aquifer. In addition to recovering groundwater, the extraction system recovers both floating and sinking oily contaminants also known as light and dense non-aqueous phase liquids (LNAPL and DNAPL). As of June 1994, an estimated 138 million gallons of groundwater had been extracted and treated; and an estimated 44,000 gallons of NAPL had been recovered. Treated effluent from the groundwater treatment plant is discharged via a single outfall in Eagle Harbor.

The treatment plant is designed for a maximum capacity of 150 gallons per minute (gpm). Under normal operations, the plant operates at approximately 35 gpm. The current limitations are summarized in Table 2.

EPA assumed responsibility for operation and maintenance of the groundwater extraction and treatment systems on November 12, 1993, because the company was financially unable to do so. Operations were continued under EPA's remedial program. At that time, the groundwater extraction and treatment systems were evaluated and found to be in an extremely deteriorated condition. The poor condition of the extraction system was primarily due to severe corrosion on the pipes and valves. The treatment system was in poor operating condition for numerous reasons, including sludge and product accumulation in the roughing tank and oil/water separators. EPA's efforts to correct these problems to date have included: evaluating options for replacement piping, beginning to clean the product and debris from the process units of the treatment system, and establishing a regular inspection and maintenance program.

Pacific Sound Resources, Inc., and their principals have settled their CERCLA liability with EPA and the federal and tribal natural resource trustees in a consent decree entered in Federal District Court in Seattle on August 29, 1994. Under the settlement, after payment of debts, all of PSR's liquidated assets will be held in an environmental trust, which will pay for a portion of the environmental clean up activities.

The ongoing RI/FS for the Wyckoff Facility OU was initiated in September 1992 and should be completed in December 1995. A focused RI/FS on the Wyckoff Groundwater OU, the basis for this Interim ROD, was initiated in May 1994 and completed in July 1994. The RI/FS for the Wyckoff Facility OU will also serve as

Table 2
Summary of Current Effluent Limitations and Monitoring Requirements (a)

CHEMICAL MONITORING					
Effluent Characteristic	Discharge Limitation		Monitoring Requirements		
	Daily Maximum (ug/L)	Monthly Average (ug/L)	Measurement Frequency	Sample Type	Reported Value(s)
Total of 16 Polynuclear Aromatic Hydrocarbons (PAHs)	20	--	Once per week	24-hour composite (c)	Maximum daily
Individual PAHs (b)					
Naphthalene	4	--	Once per week	24-hour composite	Maximum daily
Acenaphthylene	4	--	Once per week	24-hour composite	Maximum daily
Acenaphthene	4	--	Once per week	24-hour composite	Maximum daily
Fluorene	2	--	Once per week	24-hour composite	Maximum daily
Phenanthrene	2	--	Once per week	24-hour composite	Maximum daily
Anthracene	2	--	Once per week	24-hour composite	Maximum daily
Fluoranthene	2	--	Once per week	24-hour composite	Maximum daily
Pyrene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(a)anthracene	2	--	Once per week	24-hour composite	Maximum daily
Chrysene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(b)fluoranthene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(k)fluoranthene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(a)pyrene	2	--	Once per week	24-hour composite	Maximum daily
Dibenzo(a,h)anthracene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(g,h,i)perylene	2	--	Once per week	24-hour composite	Maximum daily
Indeno(1,2,3-cd)pyrene	2	--	Once per week	24-hour composite	Maximum daily
Pentachlorophenol (d)	6	--	Once per week	24-hour composite	Maximum daily
Discharge Flow (gpm) (e)	NA	--	Continuous	Recording	Maximum daily
Total Suspended Solids [TSS] (mg/L)	NA	--	Once per week	24-hour composite	Maximum daily
Total Dissolved Solids [TDS] (mg/L)	NA	--	Once per week	Grab	Maximum daily
Temperature [degrees C]	NA	--	Once per week	Grab	Maximum daily
Dissolved Oxygen [DO] (mg/L)	NA	--	Once per week	Grab	Maximum daily
pH	6.0 - 9.0	--	Once per week	Grab	Maximum daily
Metals (f)					
Zinc	95	47	Once per week	24-hour composite	Maximum daily
Lead	140	70	Once per week	24-hour composite	Maximum daily
Mercury	2.1	1	Once per week	24-hour composite	Maximum daily
Nickel	75	37	Once per week	24-hour composite	Maximum daily
Cadmium	43	21	Once per week	24-hour composite	Maximum daily
Chromium (Total)	1100	548	Once per week	24-hour composite	Maximum daily

BIOMONITORING (g)

Organism	Type of Toxicity Test	Monitoring Requirements		
		Measurement Frequency	Sample Type	Reported Value(s)
Inland Silversides (Menidia beryllina)	Acute survival test	Quarterly	24-hour composite	LC50
Purple sea urchin or sand dollar (h)	Chronic test	Quarterly	24-hour composite	IC25
Pacific oyster or mussel larvae (h)	Chronic test	Quarterly	24-hour composite	NOEC, LOEC, EC50/LC50

Notes:

- Modified from EPA's Administrative Order for Necessary Interim Response Actions No. 1091-06-03-106 dated June 17, 1991.
- Each of the 16 priority pollutants PAHs are quantified separately using EPA Method 8310 from Test Methods for Evaluating Solid Waste, Third Edition, SW-846. The 16 individual PAHs are summed to arrive at the total PAH value.
- A 24 hour composite sample is collected using an automatic sampler.
- Pentachlorophenol is quantified using EPA Method 8040 from Test Methods for Evaluating Solid Waste, Third Edition, SW-846.
- Flow is measured by a continuous flow meter.
- Metals are quantified using EPA Contract Laboratory Program (CLP) analytical methods and QA/QC, however full documentation is not required. Documentation only includes calibration, blank, accuracy, and precision results.
- Specific requirements for analytical methods, QA/QC, and reporting are provided in the attached fact sheet.
- These organisms may be used interchangeably if required.

Current Biomonitoring Requirements

I. Acute Toxicity Test Requirements:

1. For each test period (see also Paragraph I.8 below), acute survival toxicity tests are required for Inland Silversides (*Menidia beryllina*).
2. The test protocol is adapted from C.I. Weber, et al, *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*. EPA/600/4-90/027, 1991.
3. All quality assurance criteria used are in accordance with *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*, EPA/600/4-90/027. Test results which are not valid (e.g., control mortality exceeds acceptable level) will not be accepted and must be repeated.
4. The test is performed with a series of dilutions (100, 50, 25, 12.5, and 6.25 percent effluent) plus a control (0 percent effluent) to determine (1) the LC₅₀, and (2) any statistically significant differences between the results for the control and each effluent concentration tested.
5. If the test demonstrates the presence of acute toxicity, EPA will undertake the following actions as needed to determine the source of toxicity:
 - (a) Chemical analyses.
 - (b) Evaluation of treatment processes and chemicals used.
 - (c) Physical inspection of facility for proper operation of treatment units, spills, etc.
 - (d) Examination of records.
 - (e) Interviews with plant personnel to determine if toxicant releases occurred through spills, unusual operating conditions, etc.

If any toxicity remains after conducting the above steps, additional monitoring or treatment may be required.

6. A written report of the toxicity test results and any related source investigation are prepared for EPA within 60 days after the initial sampling. The report of the toxicity test results and chemical analyses shall be prepared in accordance with the Reporting Sections in the documents specified above in Section I-3.
7. Chemical testing for the parameters for which effluent limitations exist shall be performed on a split of each sample collected for bioassay testing. To the extent that the timing of sample collection coincides with that of the sampling required for the effluent limitations, analysis of the split sample will fulfill the requirements of that monitoring as well.
8. Testing shall be conducted every three months (4 times per year), until EPA modifies this requirement in writing. Additional toxicity testing is also required at any time that spills or other unusual events result in different or substantially increased discharge of pollutants.

II. Chronic Toxicity Test Requirements:

1. For each test period (see also Paragraph II.11 below), chronic toxicity tests are required for the following organisms:
 - (a) *Strongylocentrotus purpuratus* (purple sea urchin), or *Dendraster excentricus* (sand dollar).
 - (b) *Mytilus edulis* (mussel) or *Crassostrea gigas* (Pacific oyster) larvae.

The purple sea urchin and sand dollar, and the mussel and Pacific oyster may be used interchangeably if necessary.

2. In each year, the bioassay tests shall be conducted four times with each organism during the organism's natural spawning period. To the extent that these seasons overlap, testing shall be conducted on splits of the same effluent samples. Any tests which fail the criteria for control mortality as specified in the respective protocols shall be repeated on a freshly collected sample.
3. Testing is conducted on 24-hour composite samples of effluent. Each composite sample collected shall be large enough to provide enough effluent to conduct toxicity tests, as well as chemical tests required in Part II.10. below.

4. The chronic toxicity tests are performed as follows:
 - (a) For the purple sea urchin/sand dollar, tests are performed on a series of dilutions, plus a control (0 percent effluent). The IC_{25} value (the incipient concentration of effluent causing a 25 percent reduction in biological measurement, e.g., fertilization, is calculated. EPA has indicated that the IC_{25} is the approximate analogue to the no observable effect concentration (NOEC) of the effluent in the control water. The NOEC is that concentration of effluent for which survival, reproduction, or growth of the test organisms is not significantly different (at the 95% confidence level) from that of the control organisms (see *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001, March 1991).
 - (b) For the mussel or Pacific oyster larvae, tests are performed on a series of dilutions, plus a control (0 percent effluent). The NOEC, LOEC (lowest observable effect concentration), and the EC_{50}/LC_{50} (effective concentration [EC] at which 50 percent of the population shows sublethal effects such as reduction in growth and lethal concentration [LC] at which 50 percent of the population dies, respectively), are calculated.
5. The chronic bioassays are conducted in accordance with the following protocols:
 - (a) For purple sea urchin/sand dollar: *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, EPA/600/4-87/028 and The Environmental Monitoring and Support Laboratory, Cincinnati, OH, 1988.
 - (b) For mussel/Pacific oyster larvae: *Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Saltwater Bivalve Molluscs*, ASTM E 724-89.
6. All quality assurance criteria used shall be in accordance with *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*, EPA/600/4-85-013, *Quality Assurance Guidelines for Biological Testing*, EPA/600/4-78-043, and for oyster/mussel larvae test, *Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Saltwater Bivalve Molluscs*, ASTM E 724-89. The control water shall be high quality natural seawater. No exceptions will be made for artificial sea salts or concentrated brine unless Wyckoff submits data to EPA which demonstrates that the lab has reliably conducted the specified test with one of these media.
7. The results of the bioassay tests are provided to EPA within 45 days after completion of each test in accordance with the Reporting Section in *Short Term Methods for Estimating Chronic Toxicity Effluents and Receiving Water to Marine and Estuarine Organisms*, EPA/600/4-87/028, May 1988, and include any other information required by the protocols.
8. EPA and Ecology will evaluate the results to determine whether they indicate the occurrence of chronic toxicity outside the mixing zone. If it appears that this may be occurring, a toxicity evaluation and reduction plan will be prepared within 90 days. The evaluation portion of the plan may include additional toxicity testing if needed to follow up on initial results or gather information for a possible toxicity limit in the future.
9. If the sea urchin/sand dollar or mussel/oyster larvae tests prove inadequate for evaluating Wyckoff's effluent, EPA may substitute alternative tests which will provide the required toxicity information.
10. Chemical testing for the parameters for which effluent limitations exist shall be performed on a split of each sample collected for bioassay testing. To the extent that the timing of sample collection coincides with that of the sampling required for the effluent limitations, analysis of split sample will fulfill the requirements of that monitoring as well.
11. After one year, EPA may reduce the monitoring requirements to once per year, using the more sensitive species. All modifications will be approved by EPA in writing.

the final RI/FS for the Wyckoff Groundwater OU. This consolidated ROD for the Wyckoff Facility and Wyckoff Groundwater OU's should be completed by July 1996.

C. Highlights of Community Participation

Section 113(k)(2)(B) and Section 117 of CERCLA set forth the minimum requirements for public participation at sites listed on the NPL. The EPA has met these requirements and maintained an active community relations program at the site.

A community relations plan for the Wyckoff/Eagle Harbor site was prepared by Ecology in 1985 and adopted by EPA after the site was listed on the NPL in 1987. Notice of the listing of the site was published in the local paper, and a mailing list was compiled from a clip out portion of the notice. Currently, the mailing list comprises over 670 addresses. Fact sheets have been mailed to interested citizens three or four times a year since the site listing.

The community has shown consistently high interest in the site. EPA and Ecology coordinated with the local Eagle Harbor Task Force, which included local community groups and was active from 1985 to 1987. In 1988, public notice of the availability of funds for a technical assistance grant (TAG) was published, and the Association of Bainbridge Communities (ABC) applied for and received the grant. The group's volunteer technical advisory committee and a consultant hired with the grant monies have been active in EPA's Eagle Harbor Technical Discussion Group and regularly update the community in the ABC newsletter. The technical advisory committee and TAG consultants meet with EPA approximately quarterly. The community relations plan was revised in late 1990 to reflect the existence of the TAG.

Throughout the Focused RI/FS for the Wyckoff Groundwater OU, key documents were kept at the Bainbridge Island branch of the Kitsap County Regional Library for public review. The West Harbor Operable Unit Administrative Record file was placed in the library in July, 1991. The Groundwater Operable Unit Administrative Record file was placed in the library in August 1994. The Wyckoff Facility Operable Unit Administrative Record file was placed in the library in September 1994. All of the Administrative Record files are updated regularly.

The Focused RI/FS report for the Groundwater Operable Unit was released to the public for review in July, 1994. In July, 1994 the Proposed Plan for the Groundwater Operable Unit was added to the information repository, and copies of the Proposed Plan were sent to citizens on the site mailing list. A thirty-day public comment period began on July 27, 1991. EPA held a public meeting

on August 10, 1994, to provide information and answer community questions. Approximately 15 people were present.

Three letters commenting on the proposed plan were submitted to EPA, and six citizens provided comments at the August meeting. The Responsiveness Summary (page 47) outlines and responds to the concerns voiced by the community in these forums.

The interim remedy selected in this ROD was selected in accordance with CERCLA, as amended, and with the NCP. The decision is based on information in the Administrative Record for the site.

D. Scope and Role of Operable Unit Within the Site Strategy

Different environmental media, sources of contamination, public accessibility, enforcement strategies, and environmental risks in different areas of the Wyckoff/Eagle Harbor site led to the division of the Wyckoff/Eagle Harbor site into operable units. As stated above, the current division of the site is as follows:

- ♦ OU 1: East Harbor OU (subtidal/intertidal sediments)
- ♦ OU 2: Wyckoff OU (surface structures, soils)
- ♦ OU 3: West Harbor OU (subtidal/intertidal sediments, and upland sources)
- ♦ *OU 4: Wyckoff Groundwater OU (the saturated area located under the Wyckoff facility and extending towards Eagle Harbor)*

This interim ROD for the Wyckoff Groundwater OU is limited in scope and addresses only the actions necessary to contain contaminated groundwater to the site and reduce the movement of contaminants offsite into Eagle Harbor and Puget Sound. These actions will be reviewed and incorporated into the final operable unit ROD.

Efforts to control contaminant movement, through the use of a groundwater extraction system and treatment plant, are a primary focus of this interim ROD. Other activities associated with the Groundwater OU have also been incorporated at this time, including, (1) consideration of source control barriers in addition to the existing extraction wells and, (2) abandonment of water supply wells that are at risk of failure and could act as conduits for migration of contaminants to deeper aquifers.

These interim actions will be consistent with any future actions, to the extent practicable.

E. Summary of Site Characteristics

Conceptual Model

A conceptual model of the groundwater aquifers beneath the Wyckoff facility are shown in Figure 4, including:

- ♦ Unsaturated zone,
- ♦ Unconfined Water Table Aquifer,
- ♦ Hard Clay Semiconfining Unit,
- ♦ Semiconfined Aquifer.

The unsaturated zone immediately below the surface of the site is part of the Wyckoff Facility OU. This unsaturated unit is five to ten feet thick and consists of fill and native materials composed of discontinuous silt and fine sand layers.

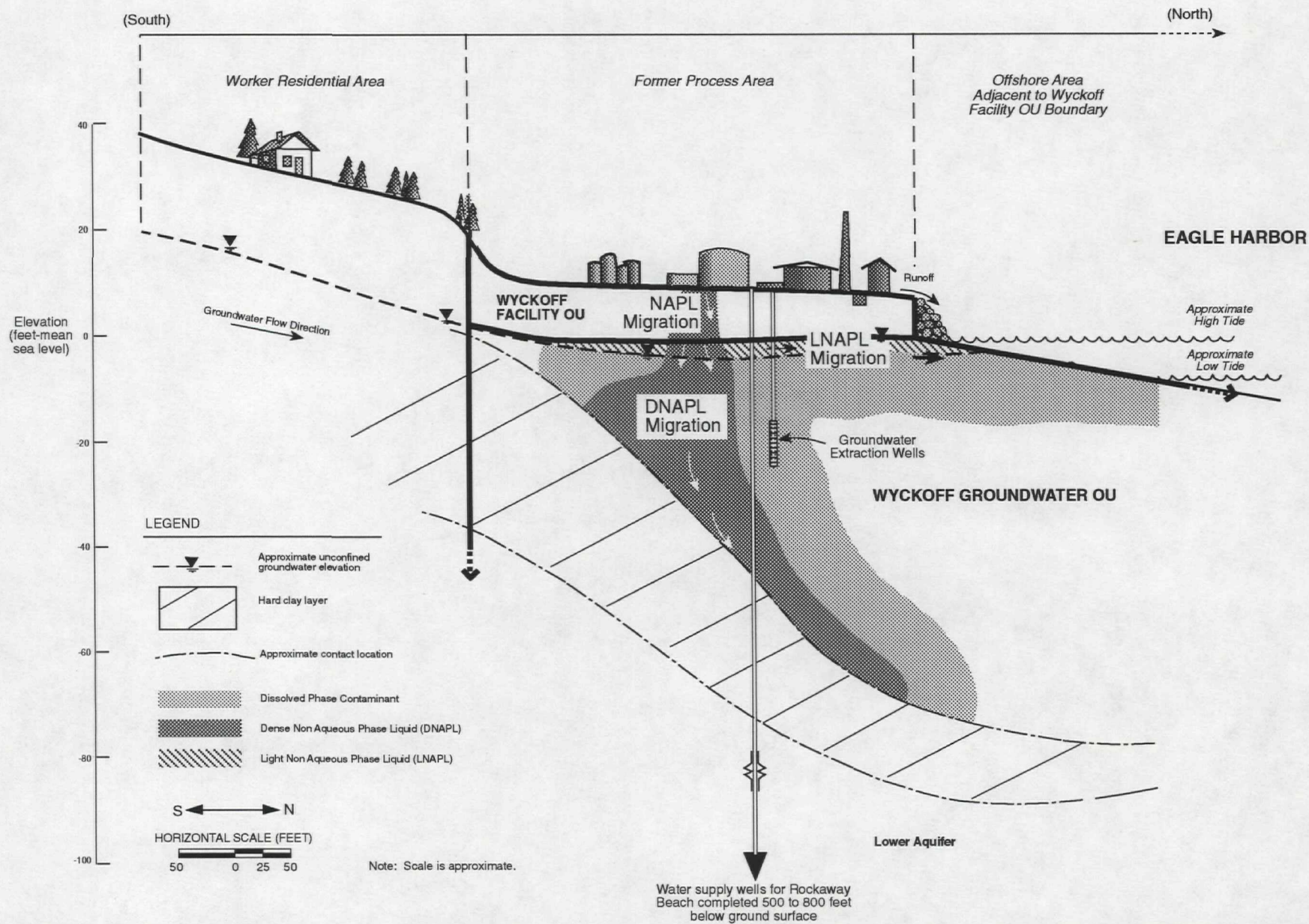
The unconfined water table aquifer, underlying the unsaturated zone, is composed of fill and native materials from 10 to 20 feet in depth, overlying coarse-grained alluvium composed of interbedded sand, gravel, and clay of various thicknesses. This alluvial layer extends down another 5 to 50 feet below ground surface. The depth to water is strongly influenced by the tides. The maximum elevation of the liquid surface within this aquifer defines the upper boundary to the Wyckoff Groundwater Operable Unit.

Separating the water table aquifer from a lower semi-confined aquifer is a relatively impermeable hard clay layer, which is interpreted to underlie much of the Wyckoff facility. The top of the hard clay layer extends from less than 10 feet below ground surface in the south central part of the site to approximately 50 feet deep along the northern portion of the site. This hard clay layer ranges from 10 to 35 feet thick at the four soil borings that have penetrated the clay.

Underlying the hard clay layer is a semiconfined aquifer which consists of gravelly silty sand, clayey sand, gravelly sand, and sandy gravel. The lower boundary of this aquifer has not been determined. Limited data from deeper well logs at the site indicate that there are at least two additional clay layers that may act as confining units between this semiconfined aquifer and even deeper aquifers.

The drinking water wells located on-site (wells B and C) are screened at approximately -500' mean sea level (msl) and -800' msl in the deeper water bearing units. Both wells B and C are under artesian pressure and generate flow to the surface at 10 gpm and 50 gpm, respectively. Four off-site drinking water wells serving Bill Point, a local residential community, and are located approximately 1500' to the south of well C and are approximately -20' msl. There is some question as to which of

Figure 4
WYCKOFF GROUNDWATER
OU CONTAMINATION



the aquifers the Bill Point wells are screened in.

Groundwater flow beneath the Wyckoff site is affected by both tidal fluctuations in Puget Sound and the groundwater extraction system which operates 24 hours a day at the site. Prior to groundwater extraction system pumping, groundwater in the unconfined water-bearing unit was observed to flow to the north where it discharged along most of the northern and eastern portions of the site. Groundwater discharge was especially evident at low tide in the form of intertidal seeps. During extraction system pumping, water level measurements indicate that groundwater converges inward, toward the extraction wells, and that the capture zone is maintained over much of the site during both high and low tides.

Nature & Extent of Contamination

Groundwater

Figure 4 graphically illustrates the conceptual site model for the movement of contaminants at the Wyckoff Facility and Groundwater Operable Units. It illustrates how contaminants introduced at the surface are thought to be moving into the lower aquifers and Eagle Harbor. Further information on the nature and extent of contamination will be developed as part of the Facility RI/FS and this interim remedial action.

The groundwater in the water table aquifer underlying the Wyckoff facility is known to be contaminated from former wood treating operations. The contaminants are dissolved in the groundwater and are present as free-phase oily liquids known as non-aqueous phase liquids (NAPL). Light non-aqueous phase liquid (LNAPL) is found floating on the unconfined groundwater table surface. Dense non-aqueous phase liquid (DNAPL) appears to be pooling on the semiconfining clay layer.

The NAPL is essentially pure product, containing pentachlorophenol and the constituents of creosote, which are primarily polynuclear aromatic hydrocarbons (PAHs). The primary contaminants in the groundwater are PAHs and substituted phenols. Acenaphthene and naphthalene were detected in over 85 percent of the groundwater samples collected at the site. Pentachlorophenol was detected in 33 percent of the samples. Table 3 summarizes the groundwater analytical data.

Offshore Area Adjacent to Wyckoff Facility OU Boundary

There continue to be observable seeps of pure product, in the form of DNAPL and LNAPL, in the intertidal zone to the north and east of the facility. The seeps have contributed to contamination of the sediment and shellfish in the East Harbor OU. Figure 5 shows the distribution of total PAH (TPAH)

Table 3
Summary of Detected Analytical Results and Comparison to MCLs for Groundwater in the Water Table Aquifer
(µg/L)

Parameter	Number of Detects	Number of Samples	Frequency of Detection	Nondetects		Detects		Federal Primary MCL (a)			Federal Secondary MCL (a)		
				Minimum	Maximum	Minimum	Maximum	Value	Count of Detects > Value	Count of Nondetects > Value	Value	Count of Detects > Value	Count of Nondetects > Value
Semivolatile Organics													
1-Naphthol	2	14	14%	50	25000	53	190						
2,3,4,6-Tetrachlorophenol	1	21	5%	10	5000	400	400						
2,3,5,6-Tetrachlorophenol	8	38	21%	4	5000	3	4500						
2,4-Dimethylphenol	2	20	10%	10	5000	410	1000						
2-Methylnaphthalene	12	21	57%	10	30000	57.5	17000						
2-Methylphenol	1	20	5%	10	5000	120	120						
2-Naphthol	1	21	5%	10	5000	130	130						
3,5-Dimethylphenol	1	21	5%	10	5000	1000	1000						
3-Nitroaniline	1	1	100%			64	64						
4-Methylphenol	1	20	5%	10	5000	120	120						
Acenaphthene*	34	39	87%	10	200	5	17000						
Acenaphthylene*	5	39	13%	4	5000	6.8	500						
Anthracene*	13	39	33%	1	5000	9	3300						
Benzo (b&k) Fluoranthene*	3	18	17%	1.5	1500	5.1	1300						
Benzo(a)Anthracene*	4	39	10%	1	5000	3.5	1700						
Benzo(a)Pyrene*	2	39	5%	1.5	5000	4.2	400	0.2	2	37			
Benzo(b)Fluoranthene*	2	21	10%	10	5000	10	2500						
Benzo(k)Fluoranthene*	1	21	5%	10	5000	13	13						
Benzyl Butyl Phthalate	1	21	5%	10	5000	53	53						
Bis(2-Ethylhexyl)Phthalate	6	21	29%	10	5000	2	1200	6	5	15			
Carbazole	12	21	57%	10	5000	3	1900						
Chrysene*	9	39	23%	1	5000	3.4	1900						
Di-N-Butyl Phthalate	1	21	5%	10	5000	280	280						
Dibenzofuran	12	21	57%	10	300	6	7400						
Dimethyl Phthalate	3	21	14%	10	5000	98	2500						
Fluoranthene*	21	39	54%	10	1000	14	11000						
Fluorene*	25	39	64%	10	6600	4	10000						
Indeno(1,2,3-cd)Pyrene*	1	39	3%	2.5	5000	3	3						
N-Nitrosodiphenylamine	3	21	14%	10	5000	11	420						
Naphthalene*	33	39	85%	10	100	4.9	130000						
Naphthalene, 1-Methyl-	14	21	67%	10	400	7	32000						
Nitrobenzene	1	21	5%	10	5000	5	5						
Pentachloroanisole	1	21	5%	10	5000	60	60						
Pentachlorophenol	13	39	33%	4	25000	7	41000	1	13	26			
Phenanthrene*	25	39	64%	1	7000	6	25000						
Phenol	1	20	5%	10	5000	270	270						
Pyrene*	20	39	51%	10	5000	7	7000						

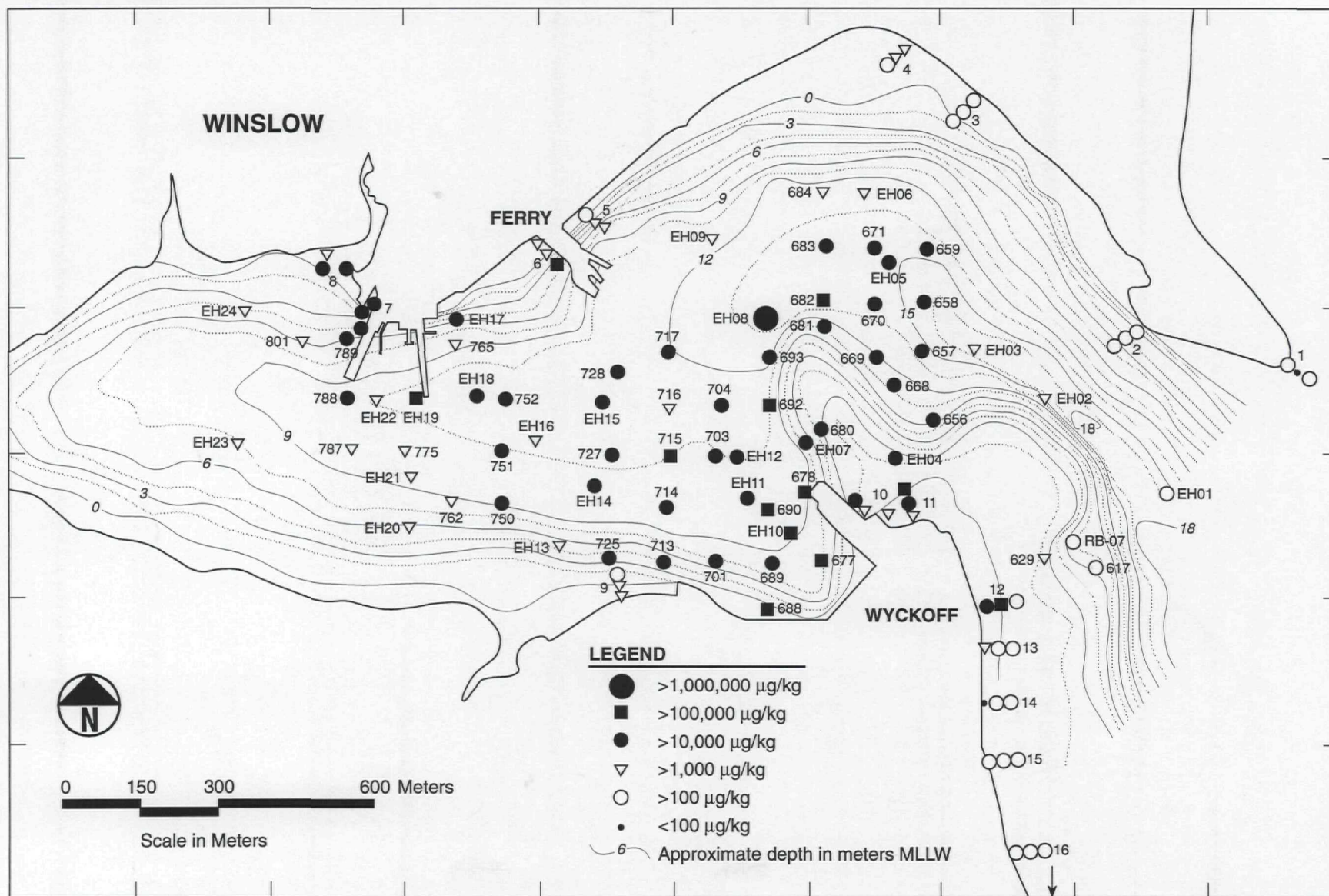
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				Minimum	Maximum	Minimum	Maximum	Value	Count of Detects > Value	Count of Nondetects > Value	Value	Count of Detects > Value	Count of Nondetects > Value
Volatile Organics													
Acetone	4	23	17%	10	72	30	430						
Benzene	5	23	22%	5	250	2	53	5	3	18			
Carbon Disulfide	1	23	4%	5	250	1	1						
Chlorobenzene	1	23	4%	5	100	250	250	100	1	2			
Ethylbenzene	13	23	57%	5	5	2	560	700					
Methylene Chloride	3	23	13%	5	100	3	180	5	2	20			
Styrene	7	23	30%	5	250	13	310						
Toluene	11	23	48%	5	5	1	800	1000					
Xylene (Total)	11	23	48%	5	5	17	2300	10000					
Metals													
Aluminum	1	21	5%	70	70	7610	7610						
Arsenic	9	21	43%	10	10	11.1	82	50	2				
Barium	11	21	52%	16	16	17	96	2000					
Cadmium	5	21	24%	3	3	3	41	5	2				
Chromium	4	21	19%	7	7	11	26						
Copper	3	21	14%	15	15	18	44	1300			1000		
Iron	15	21	71%	65	65	51.25	14400						
Lead	11	21	52%	5	5	7.05	63	15	8				
Magnesium	21	21	100%			4430	6222000						
Manganese	21	21	100%			4	1780						
Mercury	1	21	5%	0.2	0.2	0.8	0.8	2					
Nickel	3	21	14%	25	25	26	430	100	1				
Potassium	21	21	100%			1410	259000						
Silver	4	21	19%	8	8	9	13				100		
Sodium	21	21	100%			14300	8650000						
Vanadium	4	21	19%	14	14	27.5	56						
Zinc	20	21	95%	12	12	18	82				5000		

*Polynuclear Aromatic Compounds (PAHs)

(a) Federal Maximum Contaminant Level (MCL) [40 CFR 141], Federal Secondary Maximum Contaminant Level (SMCL) [40 CFR 143]; blank values indicate that there are no standards for these chemicals.

Note that field duplicate results were averaged such that a single estimator was intergrated into the database for each location sampled at a specific time. The estimator was identified as a nondetect if both results were flagged with any combination of qualifiers including "U". All other combinations were flagged as detects.



NOTE: For clarity, subtidal station numbers have been shortened by eliminating the hyphen (e.g., EH08 rather than EH-08). The three-digit subtidal station numbers are shown without the EH- (e.g., 714 instead of EH-714). EH stations (e.g., EH-08) were sampled in the PI. Numerical stations (e.g., 714) were sampled in the RI.

SOURCE: EPA, November 1989.

Figure 5
CONCENTRATIONS OF TPAH
AT STATIONS SAMPLED DURING
RI (June 1988) AND PI (1986)

concentrations found in the harbor. Visual monitoring of the seeps indicates that the partial containment that has been in effect since startup of the groundwater extraction system and groundwater treatment plant, combined with the removal of buried sludges, tank bottoms, and other source material has significantly reduced the amount of oily seepage.

F. Summary of Site Risks

EPA has determined that existing human health and environmental risks warrant control of contamination sources and cleanup of harbor sediments (Record of Decision, West Harbor Operable Unit, Wyckoff/Eagle Harbor Site, September, 1992, and Record of Decision, East Harbor Operable Unit, Wyckoff/Eagle Harbor Site, September, 1994). The risk assessments for Eagle Harbor and the Groundwater Operable Units are briefly summarized here. Although this interim ROD identifies interim actions for the Groundwater Operable Unit only, it is important to include a discussion of the Eagle Harbor risks, as groundwater and NAPL from the facility provides a significant source of contamination to the harbor. This discussion of the Eagle Harbor risks will focus on the risks resulting from PAHs.

Eagle Harbor Risk Characterization

To assess potential human cancer and non-cancer health risks, EPA used measurements of Eagle Harbor sediments and seafood and assumed exposure to contaminants from eating contaminated fish, shellfish, and sediments, and from skin contact with contaminated beach sediments. The primary human health risk was posed by long-term, regular consumption of PAH-contaminated crabs, clams, or other shellfish from Eagle Harbor. The data indicates that consumption of shellfish from areas of the East Harbor, near Wyckoff results in cancer risks in the 10^{-3} range.

Biological risks due to contamination in the East Harbor are evidenced by documented acute toxicity of sediments near the former wood treating facility, by the predicted toxicity of other sediments above apparent effects thresholds, and by the presence of PAHs, which can accumulate in the tissues of food chain organisms.

Since 1985, the Bremerton-Kitsap County Health District has maintained a public health advisory cautioning against consumption of fish and shellfish from Eagle Harbor due to both chemical and bacterial contamination. Warning signs are posted around the harbor, and the Health District provides a telephone hotline recording confirming the advisory.

Although a clean sediment cap has already been placed over the most heavily-contaminated areas of the East Harbor, the contamination in remaining areas of the East Harbor is at a level anticipated to pose a continued risk to marine organisms and to people who may eat shellfish from beaches adjacent to the Wyckoff Facility.

Wyckoff Groundwater

EPA also evaluated the potential human health risks from drinking contaminated groundwater present at the Wyckoff facility. The results of these assessments indicated that regular consumption of contaminated groundwater from the shallow water table aquifer beneath the Wyckoff facility over a long period of time poses cancer risks to those exposed. Assuming residential use of the shallow water table aquifer for 30 years, the cancer risk as a result of groundwater ingestion is estimated to be in the 10^{-3} range, primarily from ingestion of PAHs. At this time, no one is currently drinking this water.

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

G. Remedial Action Objectives

The purpose of this interim action is to ensure containment of contaminated groundwater and to protect human health and the environment. One objective of the interim action shall be to prevent contaminated groundwater and NAPL from moving offsite into the harbor. The second objective shall be to prevent contaminants from reaching deeper aquifers via onsite drinking water wells and other onsite water supply wells. Because this is an interim action, groundwater cleanup standards will not apply at this time. The cleanup standards will be determined in the final Groundwater Operable Unit ROD.

The primary role of the groundwater extraction system and treatment plant has been to create a hydraulic barrier, reducing the offsite flow of contaminated groundwater and LNAPL. Pumping the groundwater via the extraction wells creates a cone of depression which causes the LNAPL to flow towards the well, rather than out to the harbor. During the process, groundwater is removed from the aquifer and is treated to meet effluent limitations prior to being discharged into the harbor. EPA anticipates that a treatment plant in conjunction with a groundwater extraction system will be necessary for at least 20 years. The existing treatment plant has reduced the flow of contaminants in groundwater and NAPL offsite. However,

significant NAPL seepage and groundwater flow offsite still exists.

All alternatives are interim measures, designed to be consistent with the final cleanup action addressed by the overall Remedial Investigation, Feasibility Study, and final Record of Decision for the Wyckoff Groundwater OU. "Applicable or relevant and appropriate requirements" (ARARs) relating to the discharge of treated water or other wastes generated from the operation of the groundwater extraction and treatment systems shall still apply as the interim action is implemented. Final ARAR-compliant actions will be addressed in the final ROD.

The effluent discharge from the site as a result of operations from the groundwater extraction system and treatment plant shall comply with substantive requirements of an NPDES permit. Air emissions as a result of operations from the groundwater treatment plant shall comply with substantive requirements of a Puget Sound Air Pollution Control Agency permit. Abandonment of the water supply wells on site shall comply with the substantive requirements of the Washington Water Well Construction Act.

H. Description of Alternatives

Four categories of interim actions were studied:

- 1) Groundwater treatment plant,
- 2) Groundwater extraction system/hydraulic barrier,
- 3) Installation of physical barriers to inhibit movement of NAPL off site, and
- 4) Abandonment of drinking water and other water supply wells.

For each of these categories, several alternatives were identified. Overall, the alternatives fall into two categories: 1) **No Action** or minimal action to maintain the status quo; and 2) **Major Action** for the purpose of containing contaminated groundwater on the site. The schedule of actions associated with each alternative is identified in Table 5.

1) The Groundwater Treatment Plant

The current groundwater treatment plant utilizes the following processes:

- ♦ Primary treatment of extracted groundwater using physical processes to remove solids and oil and grease,

- ♦ Secondary treatment using biological processes to reduce the concentration of organic compounds, and
- ♦ Tertiary treatment using physical and chemical processes to remove residual solids and organic compounds before effluent discharge to Puget Sound.

The effluent of the plant currently meets the discharge requirements established in 1990 (see Table 2). However, the plant is in a very deteriorated condition and requires extensive maintenance to address chronic equipment failure. There is extensive corrosion of the carbon steel piping and tanks. Reliable plant operation is also confounded by poor design and installation. There is no bypass piping around individual units. Much of the piping is undersized. Some of the process equipment is improperly installed.

Alternative 1a: No Action

Alternatives 1a and 2a are linked. Under "no action," both the treatment plant and the groundwater extraction system would be abandoned, and treatment of contaminated groundwater would cease. This action has zero capital or operations and maintenance costs. However, this alternative is not protective of the human health or the environment. Abandonment of the treatment plant would lead to increased flows of LNAPL and contaminated groundwater into Eagle Harbor.

Alternative 1b: Maintain Existing Treatment Plant Operations, Including Minor Repairs.

Under this alternative, EPA would attempt to keep the existing groundwater treatment plant operational retaining existing unit processes and repairing/replacing components and devices as necessary. However, within the next one to two years, it is expected that the plant condition will have disintegrated to such a degree that safe and successful operation of the plant will no longer be possible. While the treatment plant continues to operate, treatment of contaminated groundwater would continue.

This alternative has zero capital costs. The operations and maintenance costs would be approximately \$1.2 million per year. When the current plant does break down to the point where it is no longer operable (estimated to be within the next two years), EPA would be faced with alternatives 1a or 1c and their associated costs.

Alternative No. 1c: Repair or Replace Existing Treatment Plant.

Under this alternative EPA would operate the existing treatment plant and conduct repairs as necessary for the short term. During the short term EPA would evaluate the effectiveness of a

new treatment plant and whether repair or replacement of the existing plant would be appropriate over the long term. Replacement of the existing plant would involve design, construction, and operation of a new plant and subsequent demolition of the old plant. Groundwater extraction would continued throughout this transition, using the existing plant.

EPA has completed this analysis subsequent to the proposed plan release and has determined for Alternative 1c, that construction of a new treatment plant would be more effective than repair of the existing plant. Most of the physical problems of the existing plant can be repaired but long term reliability will still be questionable. The lifespan of a repaired plant would be uncertain, with 20 years as a probable maximum. The current plant has a maximum flow capacity which cannot be expanded.

Even with a decision to build a new plant, it will be necessary to keep the current plant operating until the new plant is up and running. To keep the current plant operating successfully during the interim would require some major repairs, including a complete replacement of the piping, corrosion protection of all of the tanks, and a thorough overhaul of the plant's primary system.

The existing plant currently operates at 30 gpm with a maximum flow rate of 150 gpm. With the potential for many more extractions wells a new treatment plant will need a significantly greater design flow. It will still utilize primary, secondary, and tertiary process units to treat the groundwater prior to release into the harbor.

A 30 year estimate (+50%, -30%) of costs for this alternative with a 5% discount rate is \$23.8 million.

2) The Groundwater Extraction System/Hydraulic Barrier

The current groundwater extraction system consists of seven extraction wells. The total depth of each extraction well is 38-feet below ground surface (bgs). Each well contains a 30-foot screened interval with a three foot sump. Groundwater and NAPL are extracted from each well using two separate sets of pumps. The water pumped from each extraction well is combined in a manifold system which is then directed to the treatment plant. The NAPL recovered from the extraction wells is placed in drums next to the well head. It is later pumped into a tank on the treatment plant pad where it is stored until it is taken off site for disposal.

There is severe corrosion of the pumps and all along the carbon steel piping leading from the extraction pumps. The valve manifold where the extraction piping comes together is extensively corroded.

The hydraulic barrier created by pumping the seven existing wells in their current locations has not been sufficient to halt flow of contaminated groundwater and NAPL offsite.

Alternative 2a: No Action

Alternatives 1a and 2a are linked. Under "no action," both the treatment plant and the groundwater extraction system would be abandoned; and treatment of contaminated groundwater would cease. This action has zero capital or operations and maintenance costs. This alternative is not protective of human health or the environment. Abandonment of the extraction system would lead to increased flows of LNAPL and contaminated groundwater into Eagle Harbor.

Alternative 2b: Maintain Existing Extraction System/Hydraulic Barrier Operations.

Under this alternative, extraction of contaminated groundwater would continue using existing wells at the current low rates of efficiency. Limited maintenance would be conducted as necessary. Visual monitoring of the seeps would be continued. There would be no capital costs. Ongoing operations and maintenance costs would be approximately \$57,000 annually.

Alternative 2c: Evaluate, Maintain, and Upgrade Existing Extraction System/Hydraulic Barrier Operations

Under this alternative, EPA would develop a quantitative monitoring and modeling approach to evaluate how successful the hydraulic barrier is and could be at reducing the contamination seeping onto adjacent beaches and into the harbor.

This system evaluation would include but is not limited to the following elements:

- ♦ Develop quantitative measures of NAPL flow offsite,
- ♦ Evaluate feasibility and effectiveness of differing pump rates,
- ♦ Determine optimum depth and screened interval of extraction wells to improve efficiency of hydraulic barrier,
- ♦ Determine optimum depth and screened interval of extraction wells to improve efficiency of DNAPL and LNAPL recovery,
- ♦ Evaluate various NAPL pump/recovery schedules to optimize DNAPL and LNAPL recovery, and
- ♦ Evaluate optimum locations for additional extraction wells.

If the results of this system evaluation indicates that new extraction wells could significantly decrease the amount of contamination entering the harbor, new wells would be constructed. This alternative would also allow for existing wells to be abandoned and replaced if they are operating poorly.

Expanding the extraction system includes a number of elements including but not limited to:

- ♦ Design of wells,
- ♦ Drilling and actual construction of the wells,
- ♦ Installation of a pump for the extraction of groundwater,
- ♦ Installation of piping to transport the groundwater to the treatment plant,
- ♦ Installation of a separate pump and piping to recover NAPL from the wells, and
- ♦ Increased O&M costs due to the increase in the number of pumps and the number of locations which require NAPL recovery.

The initial monitoring and evaluation of the extraction system and the hydraulic barrier it creates would cost approximately \$50,000. Depending on the number of new wells needed and their design, expansion of the extraction system could cost up to \$42,000 per well. EPA would not put all of the wells in at one time. It would be an iterative process to determine the optimum placement and design. Depending on the degree of system expansion, operations and maintenance of the extraction system could cost up to \$11,340 per year. Thorough evaluation of the extraction system and the hydraulic barrier would begin immediately after the ROD is signed. It is possible that new extraction wells could be on-line by late 1995.

Assuming installation of 24 wells for cost comparison purposes, a 30 year estimate (+50%, -30%) of costs for this alternative, with a 5% discount rate is \$1.3 million.

3) Installation of Physical Barriers to NAPL Movement Off Site

A constructed barrier or wall would serve two purposes. One would be to physically prevent the movement of LNAPL and DNAPL offsite. The other would to limit the amount of water needed to be pumped to establish the hydraulic barrier. This would reduce the amount of uncontaminated saltwater which would need to be treated.

EPA installed a 300-foot sheet pile barrier along the north side of the transfer pit to prevent the movement of LNAPL offsite into the harbor while sludges were being removed from transfer pit. Its location was determined by the need to control NAPL movement during and after the removal action. This barrier is not tied into the clays underlying the site. It was not designed and constructed to work with the hydraulic barrier created by the groundwater extraction system nor to optimize the containment of the contaminated groundwater and NAPL onsite. There are no other barriers onsite designed to contain the movement of the contaminated groundwater and NAPL.

Alternative 3a: No Action

This alternative suggests that no measures be taken in addition to the extraction/treatment system for the containment of contaminated groundwater. There are no capital or operations and maintenance costs associated with this alternative.

Alternative 3b: Evaluate Performance of Current Extraction System/Install Barriers.

If the groundwater extraction system/hydraulic barrier evaluation (discussed under alternative 2c) indicates that the hydraulic barrier is insufficient and inefficient at preventing contaminants from moving into the harbor and the presence of a physical barrier would significantly enhance the effective and efficient containment of contaminated groundwater, a barrier wall would be installed along the north and east shores of the Wyckoff site.

At this time it is anticipated that such a barrier would either be a slurry wall or sheet pile. A barrier designed to control the movement of LNAPL would extend approximately 30 feet below ground surface. To control the movement of DNAPL the barrier would have to be anchored into the underlying clays, approximately 70 feet below ground surface. A thorough evaluation of the possible construction materials would need to account for the chemical corrosive properties of both the contaminants present and the saltwater environment and the depth of the barrier.

The 30 year estimate (+50%, -30%) of costs with a 5% discount range from approximately \$179 thousand to \$1.0 million for a slurry wall or sheet pile going 30 feet deep and from approximately \$746 thousand to \$2.5 million for a slurry wall or sheet pile going 70-feet deep.

It should be noted that this option would only be considered after a thorough evaluation of the extraction system has been conducted (alternative 2c). If it is determined that the

extraction system is effectively containing contaminated groundwater, a barrier wall would not be constructed.

4) Seal and Abandon Drinking Water And Other Water Supply Wells

The two deep drinking water supply wells located on-site, Wells B and C, are located in the facility process area. In addition there is evidence of 4 additional water supply wells located on-site. Table 1, summarizes the information known about these wells. Their locations are shown in Figure 3.

Wells B and C have provided drinking water to the facility and the Rockaway Beach Community. A replacement source of drinking water is being developed for the community by the City of Bainbridge Island. The new well for this community, the South Eagle Harbor Well, has recently been sited and installed in an area west of the facility. This new well is expected to be available for use in late 1994. The abandonment of wells B and C will not commence until the South Eagle Harbor well is on-line.

Alternative 4a: No Action

No action, in this case, would allow on-site water supply well structures to disintegrate at their own pace. Given the age and type of these wells, this disintegration could happen at any time, providing a pathway for contamination from the facility to enter lower, uncontaminated, aquifers. This could have a very severe impact on one of the few drinking water aquifers on Bainbridge Island. This action has zero capital or operations and maintenance costs. However, it is not protective of human health or the environment.

Alternative 4b: No Action/Perform Future Cleanup Action If Required.

Like the "no action" alternative, this option would allow for the natural breakdown of the existing on-site drinking water wells. However, unlike alternative 4a, this alternative calls for action once the wells disintegrate. Action would include addressing contamination of the lower aquifer, if it occurs, in addition to sealing the disintegrated wells.

Costs for the ongoing monitoring of the quality of the water coming from these wells would be approximately \$20,000 per year. It is anticipated that in addition to approximately \$700,000 to properly seal and abandon these wells it would cost an additional \$500,000 for aquifer remediation. It is unknown when these wells will disintegrate.

Alternative 4c: Seal and Abandon Onsite Water Supply Wells

Under this alternative, on-site water supply wells would be sealed and abandoned to prevent contamination of the lower aquifer. This action would not take place until the Rockaway Beach community, which currently relies upon these wells for water, is supplied by another source of water. When the new, off-site well becomes available, the on-site wells would be sealed to prevent any contamination of the lower aquifer. EPA anticipates that it would cost approximately \$700,000 to properly seal and abandon these wells.

I. Summary of Comparative Analysis of Alternatives

Each remedial alternative being considered must be evaluated according to specific criteria. The purpose of this evaluation is to promote consistent identification of the relative advantages and disadvantages of each alternative. There are nine criteria by which feasible remedial alternatives are evaluated. While all nine criteria are important, they are weighted differently in the decision making process. The nine criteria are summarized in Table 4.

Threshold Criteria

Protectiveness of Human Health and the Environment:

Alternatives 1c, 2c, 3b, and 4c are protective of both public health and the environment. A complete overhaul/replacement of the groundwater treatment plant and upgrade of the existing groundwater extraction system, Alternatives 1c and 2c would help insure that NAPL contamination does not migrate into the harbor or onto adjacent beaches. Similarly Alternative 4c, which involves abandoning the on-site drinking water wells as soon as possible, would help protect the lower uncontaminated aquifer, and prevent a more costly cleanup action. Alternative 3b, the barrier wall contingency provision, would allow for additional measures to be taken if it is determined that the extraction system is not effectively containing LNAPL and groundwater contamination.

The no action Alternatives 1a and 2a would result in the imminent failure of the existing treatment system, thus ensuring the continued contamination of the harbor and nearby beaches. Limited maintenance of the systems, Alternatives 1b and 2b, may prolong the operating life but will result in failure of the system at some point in the future. Alternative 3a would not provide the contingency for construction of a physical barrier if it is determined that the hydraulic barrier alone cannot contain the contaminants to the site. Alternatives 4a and 4b would result in the potential migration of contaminants into deeper currently uncontaminated aquifers.

Table 4:
Evaluation Criteria

EPA uses nine criteria to identify its preferred alternative for a given site or contaminant. With the exception of the no action alternative, all alternatives must meet the first two "threshold" criteria. EPA uses the next five criteria as "balancing" criteria for comparing alternatives and selecting a preferred alternative. After public comment, EPA may alter its preference on the basis of the last two "modifying" criteria.

Threshold Criteria: *

1. **Overall Protection of human health and the environment** - How well does the alternative protect human health and the environment, both during and after construction:
2. **Compliance with federal and state environmental standards** - Does the alternative meet all applicable or relevant and appropriate requirements (ARARs) under state and federal laws?

** Alternatives that are not protective or do not attain ARARs are not evaluated further under the remaining criteria.*

Balancing Criteria:

3. **Long-term effectiveness and performance** - How well does the alternative protect human health and the environment after completion of cleanup? What, if any, risks will remain at the site?
4. **Reduction of toxicity, mobility, or volume** - Does the alternative effectively treat the contamination to significantly reduce the toxicity, mobility, and volume of the hazardous substance?
5. **Short-term effectiveness** - Are there potential adverse effects to either human health or the environment during construction or implementation of the alternative? How fast does the alternative reach the cleanup goals?
6. **Implementability** - Is the alternative both technically and administratively feasible? Has the technology been used successfully on other similar sites?
7. **Cost** - What are the estimated costs of the alternative?

Modifying Criteria:

8. **State acceptance** - What are the state's comments or concerns about the alternatives considered and about EPA's preferred alternative? Does the state support or oppose the preferred alternative?
9. **Community acceptance** - What are the community's comments or concerns about the preferred alternative? Does the community generally support or oppose the preferred alternative?

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs):

No groundwater clean-up standards are included in this interim ROD. They will be determined in the final Groundwater Operable Unit ROD. All alternatives are interim measures and will become part of the final cleanup action that will attain the "applicable or relevant and appropriate requirements" (ARARs). ARARs relating to the discharge of treated water or other wastes generated from the operation of the groundwater extraction and treatment systems will apply as the interim action is implemented. Final ARAR-compliant actions will be addressed as part of the overall Remedial Investigation, Feasibility Study, and final ROD for the Wyckoff Groundwater OU.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence:

Alternatives 1c, 2c, 3b, and 4c provide the greatest potential for minimizing risks from contaminated groundwater in the long-term. A complete overhaul/replacement of the treatment plant, Alternative 1c, should result in a treatment plant with a longer operating life. Alternatives 2c and 3b allow for the expansion of the existing extraction system and the construction of a barrier wall should additional measures prove necessary to control the movement of contaminated groundwater.

Sealing on-site drinking wells in the near future, as outlined in Alternative 4c, would provide the long-term environmental benefit of protecting the lower aquifer from this potential route of contamination and is a permanent solution. Allowing these wells to collapse prior to action could result in contamination of the lower aquifer.

The other alternatives, Alternatives 1a, 1b, 2a, 2b, 3a, 4a, and 4b, would not provide long-term effective remediation. Alternatives 1a, 2a, 3, and 4a, the No Action Alternatives, do not provide any remediation at all. Maintenance of the existing treatment plant and groundwater extraction system, Alternatives 1b and 2b, would provide effective remediation for a few years at most. The further deterioration of the equipment would lead to either abandonment or replacement of both the treatment plant and the extractions system. Alternative 4b delays remediation efforts until contaminant problems have worsened.

Reduction of Toxicity, Mobility, and Volume Through Treatment:

Alternatives 1b and 1c, in conjunction with alternatives 2b and 2c respectively, provide for treatment. None of the other alternatives provide for treatment.

Short-Term Effectiveness:

The repair/replacement of the treatment plant (Alternative 1c) and expansion of the extraction system (Alternative 2c) could lead to releases of contaminated soils via airborne dust during construction. This will be mitigated by dust-control efforts. There is also the possibility of releases of contaminated groundwater as pipes and treatment plant units are taken offline and replaced. This will be mitigated by repair protocols which will require that specific units be bypassed or taken off-line while under work is underway. There is also the possibility that there will be a short-term increase in odors as a result of the construction onsite.

The construction of a physical barrier (alternative 3b) could lead to a short-term increase in the release of NAPL to the harbor. This will be minimized by construction protocols.

Implementability:

All of the alternatives being considered can be implemented with varying degrees of difficulty and have been implemented successfully at other similar sites. Alternatives 1c, 2c, 3b, and 4c provide reliable remediation.

Cost Effectiveness:

The range of costs estimated for all the alternatives evaluated are summarized in Table 5. Estimates of cost (+50%, -30%) are identified by year, as either capital expenditures or ongoing operations and maintenance, in 1995 dollars. These estimates of cost are also summarized using a 5% discount rate.

Alternatives 1a, 2a, 3a, and 4a are the least-costly alternative for this action. These costs, however, ignore the larger environmental impacts on the harbor, adjacent beaches, and deep aquifers as a result of continued contaminant migration from the facility. They also ignore the substantial monetary costs that would be incurred at a later date for cleanup of these migrating contaminants. Although Alternatives 1c, 2c, 3b, and 4c are more costly they are more cost effective approaches for achieving the remedial action objectives.

Modifying Criteria

State Acceptance:

The Washington State, Department of Ecology has been involved in the development of the focused RI/FS, supported the preferred alternative in EPA's proposed plan, and is currently considering concurrence with the selected remedy for this interim action.

TABLE 5: Comparison of Costs for Interim Remedial Alternatives

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CATEGORY 1: TREATMENT PLANT

Alternatives
1a: No Action

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995 - 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$0	\$0	\$0	\$0	\$0	\$0

1b: Maintain Existing Treatment Plant
Assumption: Treatment plant will fail w/in 2 years

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$0	\$1,152,500	\$1,152,500	\$0	\$1,152,500	\$1,152,500
1996	\$0	\$1,152,500	\$1,152,500	\$0	\$1,094,875	\$1,094,875
1997 - 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$0	\$2,305,000	\$2,305,000	\$0	\$2,247,375	\$2,247,375

1c: Repair Existing Treatment Plant

Repair & Operate
Operate

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$2,670,254	\$1,152,500	\$3,822,754	\$2,670,254	\$1,152,500	\$3,822,754
1996 - 2024	150000 / yr	\$1,152,500 / yr	\$37,772,500	\$2,157,450	\$16,576,408	\$18,733,858
30 yr TOTAL	\$7,020,254	\$34,575,000	\$41,595,254	\$4,827,704	\$17,728,908	\$22,556,612

or

1c: Replace Existing Treatment Plant
Assumption: Existing plant will operate until new plant running

Design New Plant
Construct New Plant (incl ovrsght)
Construct New Plant (incl ovrsght)
Operate New Plant

Repair & Operate Existing Plant
Operate Existing Plant
Operate Existing Plant
Demolish Existing Plant

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$440,172	\$0	\$440,172	\$440,172	\$0	\$440,172
1996	\$2,420,946	0	\$2,420,946	\$2,299,899	\$0	\$2,299,899
1997	\$2,420,946	\$0	\$2,420,946	\$2,203,061	\$0	\$2,203,061
1998 - 2024	\$0	\$1,121,047 / yr	\$30,268,269	\$0	\$14,114,430	\$14,114,430
1995	\$1,000,000	\$1,152,500	\$2,152,500	\$1,000,000	\$1,152,500	\$2,152,500
1996	\$0	\$1,152,500	\$1,152,500	\$0	\$1,094,875	\$1,094,875
1997	\$0	\$1,152,500	\$1,152,500	\$0	\$1,048,775	\$1,048,775
1998	\$500,000	\$0	\$500,000	\$430,000	\$0	\$430,000
30 yr TOTAL	\$6,782,064	\$33,725,769	\$40,507,833	\$6,373,132	\$17,410,580	\$23,783,712

TABLE 5: Comparison of Costs for Interim Remedial Alternatives

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CATEGORY 2: EXTRACTION SYSTEM

Alternative

2a: No Action

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995 - 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$0	\$0	\$0	\$0	\$0	\$0

2b: Maintain Existing Extraction SystemAssumption: Extraction System will fail
w/in 2 years

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$0	\$27,000	\$27,000	\$0	\$27,000	\$27,000
1996	\$0	\$30,000	\$30,000	\$0	\$28,500	\$28,500
1997 - 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$0	\$57,000	\$57,000	\$0	\$55,500	\$55,500

2c: Evaluate, Maintain, and Upgrade
Existing Extraction System / Hydraulic
Barrier OperationsMonitoring, Evaluation, & Design
Construction of 12 New Wells
Monitoring & Evaluation
Construction of 12 New Wells
Monitoring & Evaluation

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$60,000	\$11,340	\$71,340	\$60,000	\$11,340	\$71,340
1995	\$500,000	\$0	\$500,000	\$500,000	\$0	\$500,000
1996	\$40,000	\$11,340	\$51,340	\$38,000	\$10,773	\$48,773
1996	\$500,000	\$0	\$500,000	\$475,000	\$0	\$475,000
1997	\$40,000	\$11,340	\$51,340	\$36,400	\$10,319	\$46,719
1998 - 2024	\$0	\$11,340 / yr	\$317,520	\$0	\$142,775	\$142,775
30 yr TOTAL	\$1,140,000	\$351,540	\$1,491,540	\$1,109,400	\$175,208	\$1,284,608

TABLE 5: Comparison of Costs for Interim Remedial Alternatives

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CATEGORY 3: PHYSICAL BARRIER

Alternative

3a: No Action

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995 thru 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$0	\$0	\$0	\$0	\$0	\$0

3b: Evaluate Performance of Current Extraction System / Install Barriers

Barrier costs depend on type, depth, & length of barrier.

Assumption: soil/bentonite slurry wall
3' thick, 30' deep, 850' long
Evaluation occurs under Alternative 2c
Design of Barrier
Construction of Barrier

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$0	\$0	\$0	\$0	\$0	\$0
1995	\$31,143	\$0	\$31,143	\$31,143	\$0	\$31,143
1996	\$155,716	\$0	\$155,716	\$147,930	\$0	\$147,930
1997 - 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$186,859	\$0	\$186,859	\$179,073	\$0	\$179,073

Assumption: soil/bentonite slurry wall
3' thick, 75' deep, 850' long
Evaluation occurs under Alternative 2c
Design of Barrier
Construction of Barrier

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$0	\$0	\$0	\$0	\$0	\$0
1995	\$129,763	\$0	\$129,763	\$129,763	\$0	\$129,763
1996	\$648,816	\$0	\$648,816	\$616,375	\$0	\$616,375
1997 - 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$778,579	\$0	\$778,579	\$746,138	\$0	\$746,138

Assumption: sheetpile wall
3' thick, 30' deep, 850' long
Evaluation occurs under Alternative 2c
Design of Barrier
Construction of Barrier

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$0	\$0	\$0	\$0	\$0	\$0
1995	\$171,287	\$0	\$171,287	\$171,287	\$0	\$171,287
1996	\$856,437	\$0	\$856,437	\$813,615	\$0	\$813,615
1997 - 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$1,027,724	\$0	\$1,027,724	\$984,902	\$0	\$984,902

Assumption: soil/bentonite slurry wall
3' thick, 75' deep, 850' long
Evaluation occurs under Alternative 2c
Design of Barrier
Construction of Barrier

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (8% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$0	\$0	\$0	\$0	\$0	\$0
1995	\$428,167	\$0	\$428,167	\$428,167	\$0	\$428,167
1996	\$2,140,837	\$0	\$2,140,837	\$2,033,795	\$0	\$2,033,795
1997 - 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$2,569,004	\$0	\$2,569,004	\$2,461,962	\$0	\$2,461,962

TABLE 5: Comparison of Costs for Interim Remedial Alternatives

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CATEGORY 4: ABANDONMENT OF DRINKING WATER & OTHER WATER SUPPLY WELLS

Alternative

4a: No Action

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995 - 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$0	\$0	\$0	\$0	\$0	\$0

4b: No Action / Perform Future Cleanup Action If Required

Qtrly analysis of drinking water
Qtrly analysis of drinking water
Qtrly analysis of drinking water
Seal & Abandon Wells
Aquifer Remediation

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$0	\$20,000	\$20,000	\$0	\$20,000	\$20,000
1996	\$0	\$20,000	\$20,000	\$0	\$19,000	\$19,000
1997	\$0	\$20,000	\$20,000	\$0	\$18,200	\$18,200
1998?	\$678,607	\$0	\$678,607	\$583,602	\$0	\$583,602
1999?	\$500,000	\$0	\$500,000	\$410,000	\$0	\$410,000
2000 thru 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$1,178,607	\$60,000	\$1,238,607	\$993,602	\$57,200	\$1,050,802

4c: Seal & Abandon On-site Water Supply Wells

Seal & Abandon Wells

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
1995	\$678,607	\$0	\$678,607	\$678,607	\$0	\$678,607
1996 thru 2024	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$678,607	\$0	\$678,607	\$678,607	\$0	\$678,607

Community Acceptance:

EPA considered all comments submitted during the public comment period on the Proposed Plan. The comments have been taken into account during the selection of the interim remedy for the Groundwater Operable Unit.

Most comments indicated that the community is supportive of EPA's preferred alternative, Alternatives 1c, 2c, 3b, and 4c. Some commentors supported all four categories of EPA's preferred alternative. Most comments in opposition to EPA's preferred alternative were focused on the abandonment of the water supply wells on-site. One comment was received which indicated that there should be no action taken on the site overall. A few comments indicated a preference for no action with regard to the abandonment of the drinking water wells. Others did not question the alternative but questioned EPA's lack of financial support for the development of alternative water supplies. One set of comments questioned EPA's ability to manage the operations of the plant. EPA's responses to comments received on the Proposed Plan are included in the Responsiveness Summary.

J. Selected Remedy

Using EPA's nine criteria, EPA's selected remedy is:

- ♦ Replace existing treatment plant (Alternative 1c),
- ♦ Evaluate, maintain, and upgrade existing extraction system/hydraulic barrier operations (Alternative 2c),
- ♦ Evaluate performance of current extraction system/install physical barriers (Alternative 3b), and
- ♦ Seal on-site water supply wells (Alternative 4c).

This interim remedy has been selected because it provides a set of remediation actions that best combine containment, source remediation, and treatment measures and will allow EPA to prevent the movement of contaminants offsite, both into Eagle Harbor and into the underlying aquifers. A more detailed discussion of each of the components of the selected remedy follows. The schedule associated with each of the components to the selected remedy is identified in Table 5.

Replace Existing Treatment Plant.

This component of the interim remedial action includes a number of elements:

- ♦ Operate the existing plant,

- ♦ Repair the existing plant,
- ♦ Evaluate effectiveness of new treatment plant versus existing plant, and
- ♦ Select between rehabilitation of existing plant versus construction of new plant.

EPA has already completed the analysis as to whether construction of a new treatment plant would be more effective than repair of the existing plant. A determination has been made that construction of a new plant would be more effective. Most of the physical problems of the existing plant can be repaired, but long-term reliability will still be questionable. The lifespan of a repaired plant would be a gamble, with 20 years as a probable maximum. The current plant has a maximum-flow capacity which can not be expanded.

Implementation of this portion of the remedy includes the following elements:

- ♦ Continue operations of the current treatment plant until the new treatment plant is operable, performing repairs as needed.

These repairs shall include complete replacement of the current treatment plant's piping, a thorough overhaul of the plant's primary system and corrosion protection for many of the remaining components.

- ♦ Design the new treatment plant.

The new plant shall be designed to handle the contaminants in a saltwater environment, minimizing the corrosion problems. It will have a much longer lifespan (30 - 40 years) and will be more reliable during that time frame. The new plant shall be designed to be more efficient and more effective at meeting rigorous effluent and emission standards. The new plant shall be designed so that the capacity can be expanded if a need arises for increased flow rates. The new plant shall be designed to be less labor intensive than the current treatment plant. The new plant shall utilize primary, secondary, and tertiary process units to treat the groundwater prior to release into the harbor.

- ♦ Construct the new treatment plant.
- ♦ Operate and maintain the new treatment plant.
- ♦ Demolish the old treatment plant.

The estimate of costs in Table 6 is based on construction of a new treatment plant.

Evaluate, Maintain, and Upgrade Existing Extraction System/Hydraulic Barrier Operations

Under this component of the interim remedy, EPA shall develop a quantitative monitoring and modeling approach to evaluate the success of the hydraulic barrier at reducing the contamination seeping onto adjacent beaches and into the harbor.

The system evaluation shall include but is not limited to the following elements:

- ♦ Develop quantitative measures of NAPL flow offsite,
- ♦ Evaluate differing pump rates,
- ♦ Determine optimum depth and screened interval of extraction wells to improve efficiency of hydraulic barrier,
- ♦ Determine optimum depth and screened interval of extraction wells to improve efficiency of DNAPL and LNAPL recovery,
- ♦ Evaluate various NAPL pump/recovery schedules to optimize DNAPL and LNAPL recovery, and
- ♦ Evaluate optimum locations for additional extraction wells.

If the results of this system evaluation indicate that new extraction wells could significantly decrease the amount of contamination entering the harbor, new wells shall be constructed. This component of the preferred remedy also allows for existing wells to be abandoned and replaced if they are operating poorly.

Expanding the extraction system includes a number of elements, including but not limited to:

- ♦ Design of wells,
- ♦ Drilling and actual construction of the wells,
- ♦ Installation of pumps for the extraction of groundwater,
- ♦ Installation piping to transport the groundwater to the treatment plant,
- ♦ Installation of separate pumps and piping to recover NAPL from the well, and

- ♦ Increased O&M costs due to the increase in the number of pumps and the number of locations which require NAPL recovery.

Evaluate Performance of Current Extraction System/Install Barriers.

If the groundwater extraction system/hydraulic barrier evaluation indicates that the hydraulic barrier is insufficient and the presence of a physical barrier would significantly enhance the effective and efficient containment of contaminated groundwater, a barrier wall shall be installed along the north and east shores of the Wyckoff site. A decision on whether a physical barrier should be constructed will likely occur within the next two years.

This component of the interim remedy includes the following elements:

- ♦ Determine the relative effectiveness of a barrier in controlling the movement of LNAPL,
- ♦ Determine the relative effectiveness of anchoring the barrier into the underlying clay layer to control the movement of DNAPL,
- ♦ Determine the effectiveness of possible construction materials and configurations which could serve to physically block the movement of NAPL offsite,
- ♦ Design the physical barrier, and
- ♦ Construct the physical barrier.

At this time it is anticipated that such a barrier would either be a slurry wall or sheet pile. A barrier designed to control the movement of LNAPL would extend approximately 30 feet below ground surface. To control the movement of DNAPL, the barrier would have to be anchored into the underlying clays, approximately 70 feet below ground surface.

The wide range in costs indicated for the barrier wall (see Table 5) is a function of the area to be walled in and the method which might be used.

Seal and Abandon Onsite Water Supply Wells

EPA believes that the risks associated with the uncontrolled disintegration of the on-site water supply wells are unacceptable and that action to seal these wells in the near future is necessary. The drinking water supply wells are currently located

in the center of an area of the Wyckoff Facility where DNAPL and LNAPL have been observed. Collapse of the wells, which are screened in an uncontaminated aquifer below (refer to Figure 4), would provide a pathway for NAPL to enter the clean aquifer and the water supply system.

This component of the interim remedy allows for the proper sealing and abandonment of these wells before the deep aquifer is contaminated. On-site water supply wells shall be sealed to prevent contamination of the lower aquifer. This action will not take place until the Rockaway Beach community, which currently relies upon these wells for potable water, is hooked up to another source. When the new, off-site well becomes available, the on-site wells shall be sealed to prevent any contamination of the lower aquifer.

This portion of the interim remedy includes the following elements for each well:

- ♦ Clear the site around the well head,
- ♦ Evaluate the well to determine abandonment approach(es) utilizing video inspection and well logging where appropriate,
- ♦ Select abandonment method(s), and
- ♦ Abandon well.

Costs of Selected Remedy

The total 30 year estimate (+50%, -30%) of costs (using fiscal year 1995 dollars at a 5% annual discount rate) for EPA's selected remedy are shown in Table 6, and range from \$24.7 million to \$28.2 million. The lower end of the range assumes that: 1) no improvements are made to the extraction system based upon the results of an extraction system evaluation, and 2) there is no need to install physical barriers based upon the results of the extraction system evaluation. The upper end of the cost range assumes that: 1) twenty-four new extraction wells and pumps are added to the existing extraction system, and 2) a sheetpile barrier is constructed along the full extent of the facility boundary with the harbor. Construction of fewer than 24 wells and construction of a slurry wall rather than a sheetpile barrier would give an intermediate cost range. The current schedule for all of these interim remedial actions can be identified in Table 5.

TABLE 6: Costs of EPA's Selected interim Remedial Alternatives

09/17/94
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CATEGORY 1: TREATMENT PLANT

Alternative 1c: Replace existing Treatment Plant

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
30 yr TOTAL	\$6,782,064	\$33,725,769	\$40,507,833	\$6,373,132	\$17,410,580	\$23,783,712

CATEGORY 2: EXTRACTION SYSTEM

Alternative 2c: Evaluate, Maintain, & Upgrade Existing Extraction System / Hydraulic Barrier Operations

Low Estimate - 0 new wells constructed
High Estimate - 24 new wells constructed

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
30 yr TOTAL	\$60,000	\$340,200	\$400,200	\$60,000	\$174,296	\$234,296
30 yr TOTAL	\$1,140,000	\$351,540	\$1,491,540	\$1,109,400	\$175,208	\$1,284,608

CATEGORY 3: PHYSICAL BARRIER

Alternative 3b: Evaluate Performance of Current Extraction System / Install Barriers

Low Estimate - no physical barrier constructed
High Estimate - 75' sheetpile wall

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
30 yr TOTAL	\$0	\$0	\$0	\$0	\$0	\$0
30 yr TOTAL	\$2,569,004	\$0	\$2,569,004	\$2,461,962	\$0	\$2,461,962

CATEGORY 4: ABANDONMENT OF DRINKING WATER & OTHER WATER SUPPLY WELLS

Alternative 4c: Seal & Abandon On-site Water Supply Wells

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
30 yr TOTAL	\$678,607	\$0	\$678,607	\$678,607	\$0	\$678,607

TOTAL COSTS

Low Estimate
High Estimate

Fiscal Year	Capital Expenditures	FY 1995 \$s Ongoing O&M	Total Costs	Capital Expenditures	FY 1995 \$s (5% discount rate/yr) Ongoing O&M	TOTAL COSTS
30 yr TOTAL	\$7,520,671	\$34,065,969	\$41,586,640	\$7,111,739	\$17,584,876	\$24,696,615
30 yr TOTAL	\$11,169,675	\$34,077,309	\$45,246,984	\$10,623,101	\$17,585,788	\$28,208,888

K. Statutory Determinations

Protection of Human Health and the Environment

The selected interim remedy combines a number of containment and treatment components which are designed to be protective of human health and the environment. None of the other alternatives ensure long-term protection of human health or the environment. Protection of human health and the environment is obtained by preventing the movement of contaminated groundwater, LNAPL, and DNAPL into deeper aquifers and offsite into Eagle Harbor. This interim action will confine the contaminants to immediately under the facility. This combination of actions will eliminate, reduce, and control exposure to contaminants.

Protection of human health during implementation of the cleanup remedy will be obtained through compliance with OSHA requirements, the use of personnel protective equipment, and other safety measures and engineering controls. Short term risks to the community during implementation of the remedy will be minimized through dust control and other protective measures.

Long-term operations and maintenance will be required for the selected remedy. The effectiveness of the remedy will be evaluated as part of the final RI/FS to determine if additional source control or groundwater treatment actions are required.

Compliance with ARARs

The selected remedy will be designed and implemented to attain all ARARs identified in this section. Because this is an interim remedial action, groundwater cleanup standards are not being established in the ROD.

Applicable Federal ARARs

Clean Air Act (42 U.S.C. §§ 7401 et. seq.); Washington State Air Pollution Control Act (RCW 70.94; WAC 173-460); Puget Sound Air Pollution Control Agency (PSAPCA Regulations I & III)

The design and operations of the groundwater treatment plant will meet the substantive requirements of the ambient air quality permits.

Solid Waste Disposal Act, also known as the Resource Conservation and Recovery Act, Subchapter III, (42 U.S.C. §§ 6921-6939; 40 C.F.R. Parts 261, 264, and 268)

Off-site disposal of listed wastes resulting from operations of the groundwater extraction system and treatment plant will meet RCRA requirements.

Clean Water Act (33 U.S.C. §§ 1311; 40 C.F.R. Parts 122;
Washington State Water Pollution Control Act and Water Resources
Act (R.C.W. 90.48 & 90.54; W.A.C. 173-220)

Effluent discharge resulting from operations of the groundwater extraction system and treatment plant will meet the substantive requirements of a National Pollutant Discharge Elimination System (NPDES) permit.

Applicable State ARARs

Water Well Construction Act (R.C.W. 18.104; W.A.C. 173-160)

The rehabilitation of existing extraction wells, the construction of new extractions wells, and the sealing and abandonment of drinking water and other water supply wells will meet the standards set for proper construction and abandonment of water wells.

Shoreline Management Act (R.C.W. 90.58; W.A.C. 173-14)

The siting of the replacement groundwater treatment plant will meet the applicable substantive requirements of the Shoreline Master Plan for Kitsap County.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The extraction and treatment of contaminants from the groundwater and abandonment of the onsite water supply wells are permanent solutions. Overall, the interim actions selected represent the best balance of alternatives with respect to selection criteria, given the limited scope of the action.

Preference for Treatment as a Principal Element

Although the objective of the selected interim remedy is containment of contaminants to the site, the creation of a hydraulic barrier includes the treatment of groundwater. The selected remedy meets the statutory preference for using treatment as a principal element.

L. Documentation of Significant Changes

The Proposed Plan was released for public comment on June 25, 1994. An element of the preferred alternative (Alternative 1c) was identified as "Repair or replace existing treatment plant". However, EPA has concluded its evaluation and has made the determination that construction of a new treatment plant will be both more environmentally effective and over the long term, more

cost effective than a complete overhaul of the existing plant.
This discussed in some detail in Section J.

**RESPONSIVENESS SUMMARY
PROPOSED PLAN FOR INTERIM ACTION
WYCKOFF GROUNDWATER OPERABLE UNIT**

The purpose of this Responsiveness Summary is to summarize and respond to comments submitted regarding the Proposed Plan for interim action at the Wyckoff Groundwater Operable Unit. The public comment period for the Proposed Plan was held from July 26 to August 26, 1994. This Responsiveness Summary meets the requirements of Section 117 of CERCLA as amended.

EPA held a public meeting on August 10, 1994, in the City of Bainbridge Island, Washington, to present EPA's Proposed Plan and take public comment. The meeting was attended by approximately 15 persons. Comments were provided at the public meeting by eight individuals from the community and one representative of the Bremerton-Kitsap County Health Department. Letters were received from two individuals from the community and from a representative of the Washington Department of Natural Resources. The Washington Department of Natural Resources comments are focused entirely on issues related to the operations of the treatment plant and are discussed separately, as a set, in this Responsiveness Summary.

Paraphrased comments and EPA responses are provided below. Paraphrasing was used to incorporate related concerns expressed in more than one comment.

Comment

How much money was initially set aside for the Wyckoff Superfund project and how much has been spent to date?

EPA Response

As of August 1994, EPA has spent approximately \$14.2 million on the Wyckoff facility and groundwater operable units. The current 30 year budget estimates a total of approximately \$43 million will be required to prevent the movement of groundwater from the wood treating facility into the harbor. EPA has not developed estimates of costs for final remediation of the Wyckoff facility operable or for final remediation of the Wyckoff groundwater operable unit.

Comment

The human health risks associated with contamination at the Wyckoff/Eagle Harbor site do not warrant the cost of proposed cleanup actions.

EPA Response

EPA has determined that existing human health and environmental risks at the Wyckoff/Eagle Harbor Superfund site warrant control of contaminated groundwater at the Wyckoff facility. Contamination emanating from the shallow aquifer beneath the facility threatens fish, shellfish, and other aquatic organisms in the harbor. People who regularly consume contaminated fish or shellfish on a regular basis, or who are regularly exposed to contaminated beach sediments, may experience adverse health effects.

To assess potential human cancer and non-cancer health risks in harbor sediments, EPA used measurements of sediments and seafood and assumed exposure to contaminants from eating contaminated fish, shellfish, and sediments, and from skin contact with contaminated beach sediments. Data suggested that regular, long-term consumption of contaminated crabs and fish may pose a human health concern.

EPA also evaluated the potential human health risks from drinking contaminated groundwater present at the Wyckoff facility. The results of these assessments indicated that regular consumption from the shallow aquifer beneath the Wyckoff facility, over a long period of time, poses both cancer and non-cancer risks to those exposed.

More detailed information regarding specific numbers and factors which were used in calculating the risks for the Eagle Harbor portion of the site can be found in the Risk Assessment Report which is included in the Remedial Investigation and Field Study (RI/FS) Report for Eagle Harbor. Groundwater risks are detailed in the Risk Assessment Report for the Groundwater Operable Unit.

EPA is required under the Superfund law to select cleanup actions that are cost effective. Cost effectiveness takes into account the cost of the remedy and its effectiveness over the long-term. EPA believes that the selected remedy is cost effective because it requires a series of remedial actions that are most likely to achieve the remedial action objectives in a cost-effective manner.

Comment

Given the risk at the site, there must be better things we can do with our money.

EPA Response

Comment Noted

Comment

What is the policy regarding financial assistance to citizens affected by Superfund sites? Is there grant money available for Rockaway Beach residents to soften the blow of the new well system?

Response

The Superfund Program is paying for work related to site remediation: well sealing and abandonment, increased capacity for fire suppression, and placement of a firemain to the site fenceline. In addition, easements are being provided to allow the use of the property for the community's new well, tanks, and water supply lines.

Requests for funding to deal with other "normal" water system issues related to storage capacity, flow, condition of pipes, etc., are more appropriately addressed via state and local agencies. It is not appropriate for EPA to use Superfund moneys to upgrade the Rockaway Beach community water system, as required under other state and local regulations. The State of Washington, Department of Ecology, has provided a grant to the City of Bainbridge Island to defray approximately \$450,000 of the expense for the residents for the entire project, including the upgrade of the system.

Comment

The two water supply wells onsite should remain on line for a long enough period of time to adequately test the new drinking water well.

EPA Response

EPA is not planning to seal the two drinking water supply wells located on the Wyckoff site until after the City of Bainbridge Island has connected the Rockaway Beach community to the new well and has indicated to EPA that the system is operational. However, any indication of advanced deterioration or failure of the existing wells may require an emergency response to protect the underlying drinking water aquifer.

Comment

Two comments received at the public meeting, one of them from a representative of the Bremerton-Kitsap County Health District, supported the Proposed Plan.

EPA Response

Comment Noted.

Comment

One written comment was received supporting all of the preferred alternatives but proposing the following modification to the well abandonment alternative. EPA should consider rehabilitating the existing drinking water wells which supply Rockaway Beach. If monitoring indicates that contaminants are being introduced into the system after rehabilitation is attempted, then the wells should be sealed and abandoned.

EPA Response

As discussed in the ROD, these wells are located in the midst of extremely contaminated surface soils. In addition, the upper aquifer in this area is contaminated with both LNAPL and DNAPL. It is only a matter of time before these wells deteriorate to point where the contaminants are able to use the wells as conduits to lower aquifers and also contaminate the Rockaway Beach community water supply system. Rehabilitation of these wells is not a reasonable option. Washington Department of Ecology regulations (Water Well Construction Act, R.C.W. 18.104, W.A.C. 173-180) require that these wells be properly sealed and abandoned. EPA's decision is therefore more focused on determining how and when this action will be taken, not if it will be taken. Delay only increases the risk of contamination entering the deeper aquifers and the water supply system.

Comment

The site should be cleaned up quickly if it really poses a threat to human health and the environment. Constructing a barrier wall to contain contaminated groundwater appears to be the most effective and expedient alternative.

Response

EPA has determined that contaminated groundwater beneath the former Wyckoff wood-treating facility poses a hazard to human health as well as organisms living in the harbor and adjacent beaches. Maintenance of a viable groundwater treatment plant and extraction system at the site is

essential to the effective containment of contaminated groundwater at the site.

EPA agrees that construction of a barrier wall may be necessary to contain contaminated groundwater if the hydraulic barrier created by the groundwater extraction system proves to be insufficient. However, the hydraulic barrier created by the groundwater extraction system needs to be improved and a more complete analysis of how the groundwater flows at the site needs to be completed before a successful barrier wall could be constructed. A barrier wall alone would not be adequate for containing contaminated groundwater at the site.

Comment

If the contaminated materials present on the site are a hazard to human health, EPA has to find a faster way to do accomplish site clean-up. There is already enough information to determine what to do. The aquifer should be protected and the construction of a physical barrier is a good idea.

EPA Response

EPA has applied the principals of the Superfund Accelerated Cleanup Model to the environmental and human health problems that exist at the Wyckoff facility. The response actions provided for under this interim ROD represent a continued effort by EPA to address these problems as quickly as possible.

Washington Department of Natural Resources (DNR) Comment

EPA will need to secure DNR permission for use of state-owned aquatic lands for the effluent outfall.

EPA Response

EPA is currently working with DNR to cooperatively continue use of the existing outfall. This outfall was installed by the Wyckoff Company with DNR permission and under EPA oversight. EPA has the authority to secure necessary access to the site and areas in very close proximity necessary for response action, including the effluent outfall.

DNR Comment

DNR expressed concerns about EPA's ability to operate the groundwater extraction system and treatment plant in an environmentally responsible manner, because of the inadequacies with the existing extraction system and treatment plant which

have become apparent despite EPA's oversight of the project to date.

EPA Response

The Wyckoff Company, now known as Pacific Sound Resources, Inc. designed and installed the existing groundwater extraction system and treatment plant. Although the basic design parameters for the system addressed the need to control the release of NAPL and contaminated groundwater to the harbor, the Wyckoff Company was not able to comply with all of EPA's requirements in either the 1988 Administrative Order on Consent or the subsequent 1991 Unilateral Administrative Order. However, since EPA takeover of the system in November 1993, extensive improvements have been made.

It is EPA's determination that the groundwater treatment system must be replaced and the extraction system expanded, as provided for in this Interim ROD. EPA has retained contractors with extensive experience in the design, construction, and operations and maintenance of such systems and has budgeted adequate resources to implement the selected.

DNR Comment

EPA should conduct sediment sampling adjacent to the outfall to determine if a release of contaminants has occurred through the improper operation and disrepair of the groundwater treatment system. The sampling should be conducted in a manner that allows comparison with baseline sediment samples collected by Wyckoff in December 1989 (prior to the start of discharges from the outfall). In addition, the sampling should also allow comparison with current Ecology Sediment Management Standards (Chapter 173-204-WAC).

EPA Response

Site contaminants, at concentrations greater than the effluent limitations, have not been released by the groundwater treatment plant. Weekly monitoring of the effluent has demonstrated this. It is EPA's intent, as part of good treatment plant operating procedure, to sample sediments adjacent to the outfall at appropriate intervals to demonstrate that contaminants are not entering the sediments from the effluent. This sampling will occur during the upcoming fall/winter.

DNR Comment

The alternatives analysis for the Groundwater Treatment System should include an evaluation of other options for disposal of treated effluent besides discharge to the marine environment. Other options may include:

- ♦ Connection of the plant to a sanitary sewer,
- ♦ Evaporation,
- ♦ Land disposal,
- ♦ Reuse of treated water, and
- ♦ Transport to an appropriate disposal facility.

EPA should use this alternatives analysis to amend its Proposed Plan and allow additional comment.

EPA Response

EPA examined options for treated effluent besides discharge into the marine environment and found that they are not feasible. The following discussion describes potential disposal options and qualitatively evaluates their practicability based on cost, water quality impacts caused by high salinity, and general implementability.

Treated effluent from the Wyckoff groundwater treatment plant is currently being discharged via an outfall to Puget Sound. The current discharge volume is approximately 18 million gallons per year at current minimal extraction rates rising to 100 million gallons per year or more at full capacity. Because of the proximity of the extraction wells to the Sound, the pumped groundwater is approximately 50 percent seawater based on a chloride content of approximately 11,000 milligrams per liter and electrical conductivity of 24-ohm-cm. As a result, the chloride concentration greatly limits the disposal options of the treated effluent.

- ♦ *Discharge to POTW - There are no sewer lines on the south side of Eagle Harbor. Three to four miles of line would have to be laid to the nearest sewer on Weaver Street (or a mile of sub-harbor line to the ferry dock). The capacity of the existing sewer lines may be inadequate to convey the additional 18 to 100 mgd or more. Discharge of the high chloride effluent to the sanitary sewer system would cause significant corrosion problems to the sewer collection system, pumps, and mechanical treatment systems. Also, the high chloride water would likely disrupt the biological treatment processes.*

- ♦ *Evaporation (including passive and energy enhanced) - Because of the low pan evaporation rates for areas west of the Cascade Range (approximately 24 inches per year), evaporation ponds for disposal of treated effluent would require an extremely large surface area (approximately 25 to 150 acres or more). Given the site constraints (area of the property) and the lack of additional open space with in the vicinity of the treatment plant, it is unlikely that sufficient property could be obtained to technically and feasibly implement passive evaporation.*

The energy requirements, capital costs, and operating costs associated with energy enhanced evaporation (incineration and dehydration) of this large volume of water would not be feasible.

- ♦ *Land disposal (including land application and shallow infiltration) - Ecology typically requires agronomic application rates for wastewater disposal to minimize shallow groundwater contamination. Required land area would be large (one to two times the area for evaporation), holding tanks/ponds would be needed to store effluent during the winter, it is unlikely that a salt tolerant crop could be found, and salt would buildup in the soil to the point that infiltration would stop. Therefore, land application is not practicable.*

Shallow infiltration using drain field/recharge trenches or recharge ponds would contaminate the shallow groundwater with high chloride water. Even if this were permitted, the geochemical incompatibility of the effluent and shallow soils and groundwater would create a major O&M problem for an infiltration system.

- ♦ *Reuse of treated water - EPA is unaware of reuse applications requiring the use of high chloride water mainly due to corrosion and phytotoxicity problems. EPA is unaware of any facilities in the area that require cooling water. If the effluent were to be used as a saline cooling water, corrosion would be a major problem.*
- ♦ *Transport to an appropriate disposal facility - Disposal the large volumes of effluent (approximately 18 to 100 mgy) at any offsite waste disposal or processing facility would not be economical due to high transportation and disposal costs.*

Another potential disposal option not listed in the DNR letter is deep aquifer injection.

- ♦ *Deep aquifer injection - This option would require a massive multi-year study to identify and characterize a suitable non-potable aquifer for injection and prove its current and long-term hydraulic isolation. Based on the existing water supply, wells on the injection zone would have to be deeper than 800 feet. The cost of the study, long-term monitoring, and O&M and the time required to meet the substantive requirements of the Ecology UIC permit make this option non-viable.*

Even without preparing detailed cost estimates for each of these disposal alternatives, it is apparent that any of the options would have a significantly higher cost than the current method of effluent disposal (i.e., diffused discharged to Puget Sound). The higher costs coupled with the obvious incompatibility of the saline effluent with many of the disposal alternatives clearly indicates that the current method of discharge is the most appropriate. Moreover, the adoption of any of the disposal alternatives only moves the contaminants in potentially inadequately treated effluent (which are DNR's major concern) from one point in the environment to another.

DNR Comment

Current effluent standards for discharges from the groundwater treatment plant should be revisited given potential changes in technology over the past six years. The current standards were provided as ARARs to EPA by Ecology in a letter dated August 24, 1988, from Nigel Blakely. DNR wants assurances that any upgrades to the treatment plant will use best available technology and meet substantive requirements of the Clean Water Act and NPDES programs.

EPA Response

EPA has been and is currently working very closely with Ecology to identify effluent limitations for both the existing treatment plant and any new treatment plant which may be constructed. As stated in the ROD, it is EPA's intent to meet the substantive requirements of the NPDES program under the Clean Water Act.

DNR Comment

EPA, with Ecology oversight should conduct a sediment impact zone evaluation for the proposed discharge in accordance with the Sediment Management Standards WAC 173-204-400 et. seq.). Ecology has already identified the Sediment Management Standards as an ARAR for Eagle Harbor, and a sediment impact zone evaluation is necessary to ensure compliance with the National Contingency Plan. If a sediment impact zone is necessary, EPA's operation of

the treatment plant must meet substantive provisions of the Sediment Management Standards for this topic.

EPA Response

EPA will use the results of the upcoming effluent outfall sediment sample collection effort discussed above to determine if a sediment impact zone evaluation is necessary. It is very likely that the data will clearly indicate that there is no sediment impact resulting from the outfall. If the data indicates otherwise, the EPA, in consultation with Ecology, will conduct a sediment impact zone evaluation for the effluent outfall.

- ♦ Evaluate, maintain, and upgrade existing extraction system/hydraulic barrier,
- ♦ Evaluate performance of current extraction system/ install physical barrier,
- ♦ Seal and abandon onsite water supply wells.

Statutory Determination

This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements for this limited-scope action, and is cost effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the Groundwater Operable Unit, the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume as a principal element will be addressed fully by the final response action.

Subsequent actions are planned to fully address the threats posed by the conditions at this operable unit. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD, review of this site and this remedy will be ongoing as EPA continues to develop final remedial alternatives for the Groundwater Operable Unit.

Date _____

 Chuck Clarke
 Regional Administrator
 U.S. Environmental Protection Agency
 Region 10

HWD CONCURRENCE

INITIAL	PLR	MS	CR	RFS
NAME	P Rubenstein	M Stoner	C Rushin	R Smith
DATE	9/29/94	9/27/94	9/29/94	9/29/94

- ♦ Evaluate, maintain, and upgrade existing extraction system/hydraulic barrier,
- ♦ Evaluate performance of current extraction system/ install physical barrier,
- ♦ Seal and abandon onsite water supply wells.

Statutory Determination

This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements for this limited-scope action, and is cost effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the Groundwater Operable Unit, the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume as a principal element will be addressed fully by the final response action.

Subsequent actions are planned to fully address the threats posed by the conditions at this operable unit. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD, review of this site and this remedy will be ongoing as EPA continues to develop final remedial alternatives for the Groundwater Operable Unit.

Date

 Chuck Clarke
 Regional Administrator
 U.S. Environmental Protection Agency
 Region 10

ORC CONCURRENCE

INITIAL	<i>CO</i>	<i>AB</i>	<i>EK</i>
NAME	C Ordine	A Boyd	E Kowalski
DATE	<i>9/27/94</i>	<i>9/28/94</i>	<i>9/28/94</i>



9.5.2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101
November 22, 1994

Reply To
Attn Of: HW-113

MEMORANDUM

SUBJECT: Wyckoff Groundwater Operable Unit
Wyckoff/Eagle Harbor Superfund Site
Interim Record of Decision
Errata Sheet

FROM: Christina Ngo *Christina Ngo*
Superfund Project Manager

Howard Orlean
Superfund Project Manager

TO: Wyckoff/Eagle Harbor Site File

CC: Guy Barrett
State Project Manager, Department of Ecology

The following are corrections and clarifications to the September 30, 1994 Interim Record of Decision for the Wyckoff Groundwater Operable Unit of the Wyckoff/Eagle Harbor Superfund Site, Bainbridge Island, Washington.

Page 9, paragraph 3:

Clarification: The Wyckoff Company is also a potentially responsible party (PRP) for Eagle Harbor contamination pursuant to the 1987 PRP search.

Page 10, paragraph 3:

Correction: Under current conditions, the plant operates at approximately 35 gpm.

Page 15, part D, paragraph 2:

Clarification: These actions will be reviewed and incorporated into the final Wyckoff operable unit ROD.

Table 3:

Correction: Spelling of "Comparison".

Table 5, Alternative 3b:

Correction: Barrier costs depend on type and depth.

Correction, Assumption 4: Sheetpile wall.

9.5.2-0002

General Clarification:

The attached table, Table 5a, uses the information given in Table 5 to clarify estimated interim remedial action costs within a three-year period (1995-1997).

TABLE 5a: Interim Remedial Action (IRA) 3-Year Cost Estimates*

Action	Year	Description	Cost (\$)
1c	1995	Repair and Operate Existing Plant	2,152,500
	1996	Operate Existing Plant	1,152,500
		Construct New Treatment Plant	2,420,946
		1997	Operate Existing Plant
		Construct New Treatment Plant	2,420,946
Subtotal			9,299,392
2c	1995	Construct 12 Groundwater Extraction Wells	500,000
	1996	Construct 12 Groundwater Extraction Wells	500,000
Subtotal			1,000,000
3b	1996	Construction of Barrier	
		Soil/Bentonite Slurry Wall (3' x 30' x 850')	155,716
		or	
		Soil/Bentonite Slurry Wall (3' x 75' x 850')	648,816
		or	
		Sheetpile Wall (3' x 30' x 850')	856,437
		or	
		Sheetpile Wall (3' x 75' x 850')	2,140,837
Subtotal			\$155,716 to \$2,140,837
4c	1995	Seal and Abandon Wells	678,607
Subtotal			687,607
TOTAL			\$11,133,715 to \$13,118,836

* Costs derived from Table 5, GWOU Interim Record of Decision, September 30, 1994.